the OIL AND GAS JOURNAL

REPORT ON PERMIAN BASIN ... WITH INSERT MAP

hand work is hard work

BJ engineering puts POWER to work for you!

***Power is the key*** to faster drilling at less cost. These BJ POWER TOOLS eliminate slow, costly hand work – help you run pipe faster – save you money on every trip!

***BJ Type B Power Slips*** are pressure raised and pressure set at the touch of a foot pedal . . . pipe is pressure centered. Handle 2⅜" to 7" drill pipe or casing by simply changing single-unit slips. Can be unitized with any rotary and installed without substructure changes.

***BJ Power Tong*** spins and makes up in one operation. Eliminates dangerous spinning ropes and chains. One man can latch on or remove from joint by means of a single control handle. *Latch operation is automatic.* Runs drill pipe and casing from 4" to 9⅝" through four sizes of quickly changed lug jaws.

BJ MEANS ENGINEERED OIL TOOLS

Byron Jackson Co.

MAIN OFFICE & PLANT: LOS ANGELES 54, CALIF.

Mid-Continent Office & Plant: Houston 1, Texas

Export Office: New York 17, New York

FURNISHERS OF BJ PERMANENT OIL TOOLS

**From the many reasons operators have given for preferring Lane-Wells service**

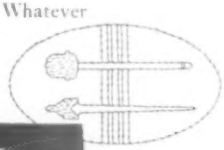
# we quote

"Call it performance, or efficiency, if you like. But your men are on top of the job all the time, and it shows in the way they work. No lost time, but no cutting corners either. They know what the job needs, they bring the equipment it calls for, and they do the job up right."

"Your men—the ones I deal with, anyway—know as much about this field and its particular conditions as I do. When they come on my rig, I don't have to waste time explaining local problems—they know 'em and are ready to handle 'em."

"Service—quick service, on-time service—is an awful big point to me. Down-time is expensive, so I like the fact that Lane-Wells always seems to have a branch near me, with enough equipment to give me service when I need it."

"Mister, if you hated runarounds and double-talk the way I do, you wouldn't have to ask! I string with Lane-Wells because I can believe what their men tell me. They give me the straight dope, they don't try to alibi themselves out of a tough spot. Whatever they tell me, they make good, and they do their work the same way."



*Call* **LANE WELLS** *for* **BETTER PERFORATING** ***get the job done right***

General Offices, Export Office, Plant • 5610 So. Soto St., Los Angeles 58

*Tomorrow's Tools Today!*

LOS ANGELES • HOUSTON • OKLAHOMA CITY • LANE-WELLS CANADIAN CO. IN CANADA • PETRO-TECH SERVICE CO. IN VENEZUELA

AG-511

THE OIL AND GAS
# JOURNAL
Vol. 51, No. 24

## CONTENTS FOR OCTOBER 20, 1952

### NEXT WEEK

- Electrical Treater for Desludging Gasoline.
- Trends in Natural-Gas Consumption.
- Natural-Gas Storage at Oakford, Pa.
- Stay-at-home Drilling Rig.
- How to Find Oil-Water Contact in a Reservoir.
- Design and Operation of Packaged Gasoline Plants.
- Duval Gasoline Co.'s New Skimming Plant.
- Drilling-Mud Pointers.
- Use of Force-Balance Transmitters in Control of Fractionating Columns.
- New Tanker-Loading Facilities.
- Other Articles and Regular Features.

### REGULAR DEPARTMENTS


| | |
|---|---|
| They Say | 61 |
| Calendar of Events | 64 |
| Journally Speaking | 71 |
| Editorial | 73 |
| This Week | 75 |
| Watching Washington | 88 |
| International News | 92 |
| Personals | 96 |
| Deaths in the Industry | 101 |
| On the Job | 176 |
| Engineering Reference | 181 |
| Engineering Fundamentals | 183 |
| Refiner's Notebook | 185 |
| Questions on Technology | 187 |
| Pipe-Line Construction | 189 |
| Pipe-Line News | 196 |
| Drilling Contractors | 201 |
| Running High | 201 |
| Active Rotary Rigs | 202 |
| Refining News | 205 |
| Natural-Gas News | 207 |
| Exploration Statistics | 230 |
| Production Statistics | 231 |
| Refining Statistics | 232 |
| Market Statistics | 233 |
| Equipment Men in News | 234 |
| Classified Advertising | 238 |
| Advertisers' Index | 243 |


### EXPLORATION—DEVELOPMENT


| | |
|---|---|
| Oil-Finding Fable | 209 |
| Highlights of Week | 209 |
| Reports by Areas | 210 |


### NEWS FEATURES


| | |
|---|---|
| Study by 32 Companies Shows Cost of New Oil Up Since War | 76 |
| Committee Tells PAD More Small-Diameter Line Pipe is Needed | 76 |
| Industry Goes All Out in Observing Oil Progress Week | 77 |
| Seismologists Need Accurate Way to Measure Sound Velocity | 78 |
| Low-Temperature Gasoline Plant May Overcome Petrochemical Problem | 79 |
| August Imports and Exports of Both Crude and Products Decline | 79 |
| W. R. Grace to Build $18,000,000 Petrochem Plant Near Memphis | 80 |
| Gulf Seeking Approval of Secondary Recovery at Goldsmith Field | 81 |
| Money, Not Patriotism, Needed to Find Oil, Windfohr Says | 81 |
| Permian Basin Oil Show Viewed by Record Crowds at Odessa | 82 |
| Engineers Study Highly Profitable Water-Flood Projects in Kansas | 83 |
| Uses of Asphalt Specialties by Industry Unlimited, W.P.R.A. Told | 84 |
| All Canadian Obstacles to Westcoast Transmission Line Removed | 85 |
| Oil Companies Appeal Lower Court Decision in "Cartel" Case | 87 |
| Complete Collapse of Efforts for Settlement in Iran Imminent | 92 |
| Amerada, Conoco, Ohio Acquire One-Half of Somaliland Concession | 93 |


### ENGINEERING-OPERATING FEATURES


SPECIAL PERMIAN BASIN SECTION ... 102-150

Spraberry Spacing Report ... 102
Important data from Texas Railroad Commission hearing on Spraberry trend well-spacing problem. By Roy F. Carlson.

Regional Subsurface Geology of Midland Basin ... 113
Tectonics, structure, and stratigraphy of the Midland basin, with special reference to Permian system. By F. P. Warn, Roy P. Carmack, and Raymond Sidewell.

Ten Rigs Active in Strawn Reef Search in Schleicher County ... 124
Drilling activities in four fields; aggregate allowable now totals 7,846 bbl. per producing day for area. By Joseph A. Kornfeld.

Petroleum Possibilities in Eddy and Chaves Counties, New Mexico ... 127
These two counties have extremely favorable wildcat areas for commercial accumulation of petroleum. By Phil D. Helmig, Malco Refineries, Inc.

Wellman Reef: 2 Million Barrels in 2 Years ... 135
Twenty-seven oil wells are now producing from this thick, rich reef section in the West Texas basin. By Joseph A. Kornfeld.

How to Determine a Kelly's Useful Life ... 148
New welding method increases normal life. By R. B. Tuttle.

OTHER ARTICLES AND FEATURES ... 152-188

Electronics in Geophysical Instrumentation ... 152
Mobile magnetometer, scintillation counter, and electronic logging cartridges are important new tools. By Francis F. Segesman, Schlumberger Well Surveying Corp.

"Built-In" Crossing of Highway Bridge ... 163
Oklahoma Natural lays 18-in. line on roller pipe hangers between I-beams under bridge. By Joseph A. Kornfeld.

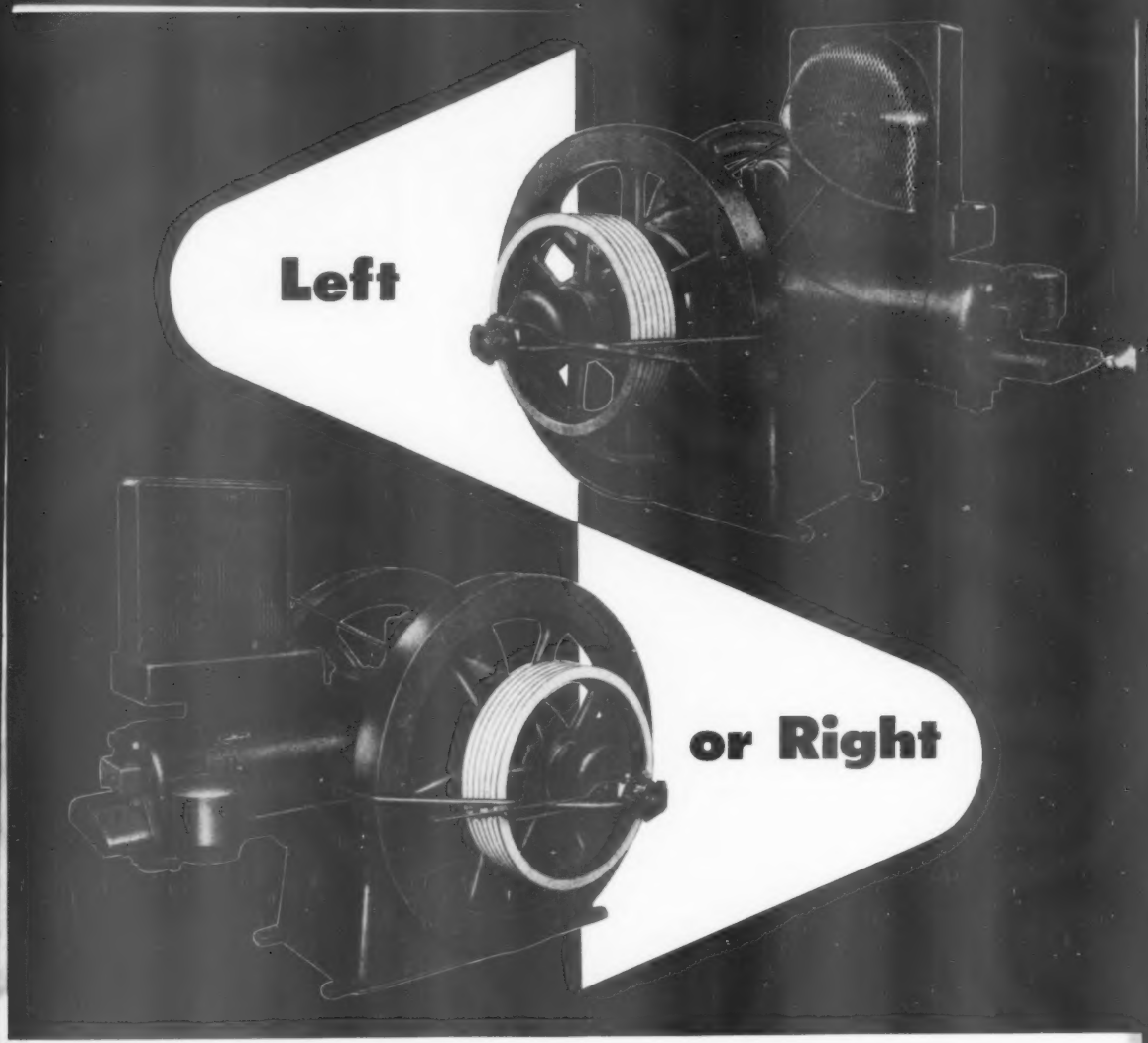
Drilling Performance of Large Power Pumps ... 169
Pumps in 700 hydraulic horsepower class satisfy present drilling requirements; economies result from proper operation. Paper presented at national meeting, American Association of Oilwell Drilling Contractors, Oklahoma City, September 29-30, 1952. By Earle C. Hellums, Cron & Gracey Corp.

Physical Properties of Important Petrochemical Materials ... 173

Where Petrochemicals Come From ... 174
Many are attainable by direct extraction from petroleum. Compiled by the Journal staff.

On the Job . . . Storage-Tank Maintenance ... 176
Proper painting of tanks assures long life.

Engineering Reference Section ... 181-188




## *is right with the "ZC"*

With a Fairbanks-Morse *"ZC"* Engine on your pumping rig, you can mount your clutch and sheave on either the *right* or *left* side of the engine. It's a big convenience feature that makes it easy for you to mount the engine where you want it on your pumping jack.

The TWO big flywheels of the "ZC" make this feature possible and give you the important flywheel effect on each side of the engine for smooth operation and economical performance.

The Fairbanks-Morse Type "J" clutch and sheave assembly are ruggedly built units with extra heavy friction plates and contact parts to prevent distortion and assure uniform pressure at all times.

For the complete story on the *"ZC" . . . the engine with the big double wheels*, see your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

**FAIRBANKS-MORSE,**
***a name worth remembering***

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

# You helped design these better ropes

The needs of *your* particular job dictate the design and construction of Macwhyte Wire Rope. Over the years, Macwhyte engineers have kept in close touch with wire rope users in every field. Their experience — and yours — is combined to help produce rope that will give maximum performance . . . not just adequate performance.

Let us help you get the utmost in wire rope performance on your particular equipment. For prompt, accurate recommendations . . . . . call a Macwhyte distributor or write direct to Macwhyte Company.

## MACWHYTE COMPANY

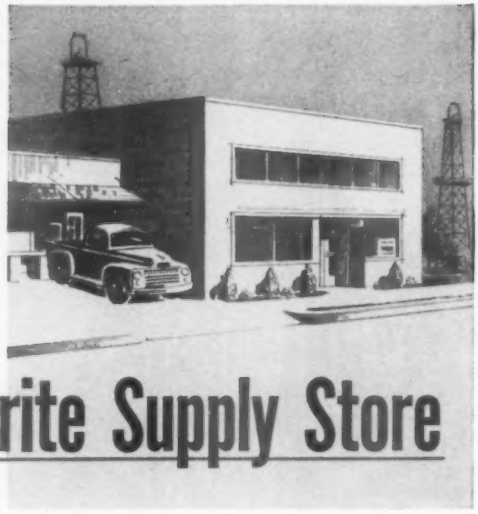
**2916 Fourteenth Avenue, Kenosha, Wisconsin**

*Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies. Mill depots: New York • Pittsburgh • Chicago • St. Paul • Fort Worth • Portland • Seattle • San Francisco • Los Angeles. Distributors throughout U. S. A.*

**A thousand and one** wire ropes
*PREformed and internally lubricated*
**Ask for Catalog G-15**

1023

# Now you can get WITTE ENGINES through your favorite Supply Store



**HERE'S GOOD NEWS** for oilfield engine users! The complete line of sturdy, heavy-duty slow-speed Witte Engines—in gas-gasoline models from 5 to 15.5 hp and full diesel models from 4 to 12.5 hp—may now be purchased through a number of supply stores in every locality.

Witte Engines are known throughout the oilfields for the outstanding operating and maintenance records they have set in a wide variety of power-unit applications within their performance range. Built on the four-cycle principle, they'll give you long, satisfactory service at the lowest operating costs.

If your power requirements are within the Witte range, it will pay you to ask YOUR Supply store about Witte Engines today.

**WITTE ENGINE WORKS**
**OIL WELL SUPPLY DIVISION**
**UNITED STATES STEEL COMPANY**
**Kansas City 3, Mo.**

## WITTE ENGINES

USS

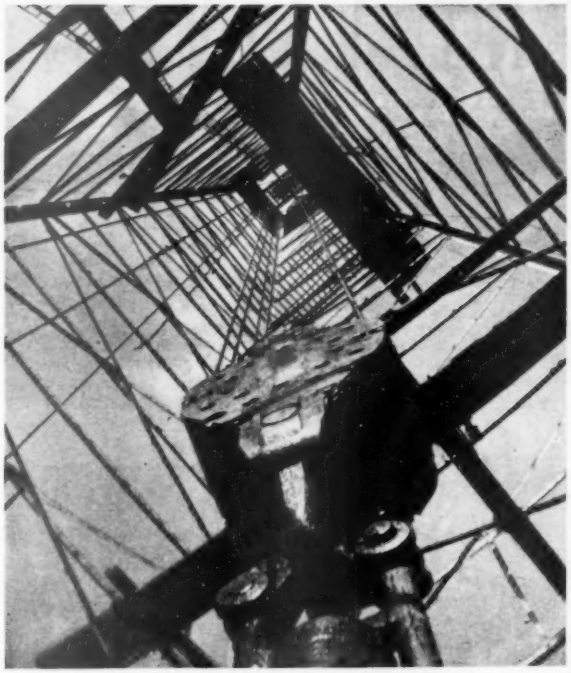
*Gas-Gasoline* — Models from 5 to 15.5 hp

*Full diesel* — Models from 4 to 12.5 hp

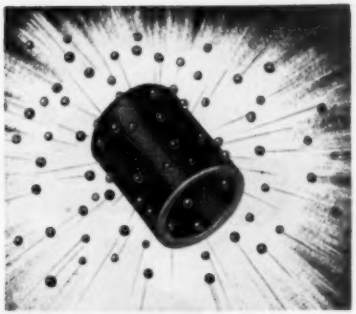
UNITED STATES STEEL

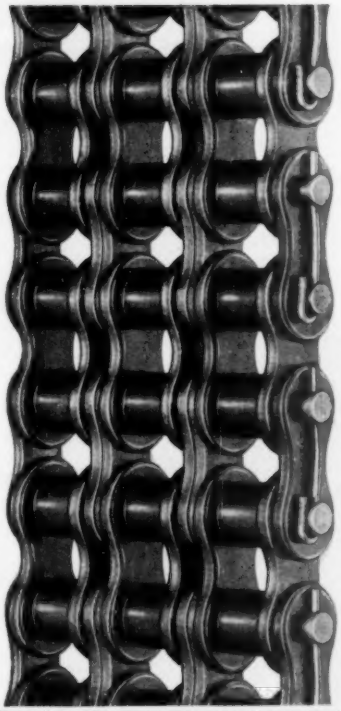
# In the Oil Country...

# DOWN-TIME HURTS!



***Shot-peening hammers extra performance, extra life into Link-Belt Roller Chains***





Up comes 15,000 feet of drill pipe at high speed. Sudden stops, sudden starts, rough handling of equipment to get the job done. It's *time* that counts most in the oil country. And, it's *down-time* that hurts. Drilling equipment, in these days of three-mile-deep holes, *must stand the gaff!*

Link-Belt, through 75 years of research, is taking care of your chain problems. Shot-peening of rollers in Link-Belt Precision Steel Roller Chains is *just one* of the ways we're doing it. Thousands of tiny steel balls hammer extra fatigue life into the rollers. You get a longer service life. This and other *extra* Link-Belt features so widely known in the oil fields of the world help repay your chain costs in down-time saved.

Get all the facts from your nearest Link-Belt office.

**LINK-BELT**

**PRECISION STEEL ROLLER CHAIN**

**LINK-BELT COMPANY:** Indianapolis 6, Dallas 1, Houston 1, Kansas City 8, Mo., Los Angeles 33, New York 7, Toronto 8. Distributors in all fields. 12,933

**Easier coupling and uncoupling without sacrificing load distribution**

Patented E-Z Assembly feature of Link-Belt Precision Steel Roller Chain permits easy coupling and uncoupling of multiple width chains—right on the job. Press-fits between chain pins and middle bars have been modified, but full load-carrying capacity across entire width of chain has been maintained.


The Oil and Gas Journal, published Mondays, copyright 1952, by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $4 yearly.

# ALL FORGED STEEL

# Edward

# INSTRUMENT VALVES

## *Lowest Cost Valves for Their Rating!*

**Standardize on Edward instrument valves—forged steel, yet their price is comparable to ordinary bar-stock valves.**

**Edward instrument valves are top-quality in every design detail—easy-grip T-handle . . . bronze yoke bushing . . . forged steel one-piece outside screw yoke . . . forged steel corrosion-resistant EValized packing gland . . . EValloy 13% chromium stainless steel stem-disk with needle point for close flow control . . . forged steel EValized gland bolts that swing out of the way for easy repacking . . . heat resistant die molded EValpak packing.**

***And look at this versatility—***

**★ STEAM, WATER, OIL or GAS PRODUCT PROCESS LINES**

**Edward instrument valves fit into any piping system. Globe or angle, sizes ¼", ⅜", ½", ¾" and 1".**

**★ HIGH TEMPERATURES or HIGH PRESSURES**

**Rated up to 6000 lb at atmospheric temperatures, or up to 1500 lb at 1000 F.**

**★ STANDARD or CORROSIVE SERVICE**

**Available in carbon steel or 13% chromium bodies and trim.**

**★ TYPICAL USES**

| | |
|---|---|
| **Orifice Meters** | **Regulators** |
| **Instrument Panels** | **Gage Lines** |
| **Oil Field Xmas Trees** | **Drip and Drain Lines** |
| **Hydraulic Systems** | **Pressure Recorders** |
| **Vent Lines** | **Corrosive Lines** |

**Get the full story on Edward instrument valves—*the lowest cost valves for their rating.* Write for Bulletin 491.**

## Edward Valves, Inc.

Subsidiary of ROCKWELL MANUFACTURING COMPANY

1492 WEST 145th STREET, EAST CHICAGO, INDIANA

EAST CHICAGO, INDIANA

**Another** **Product**

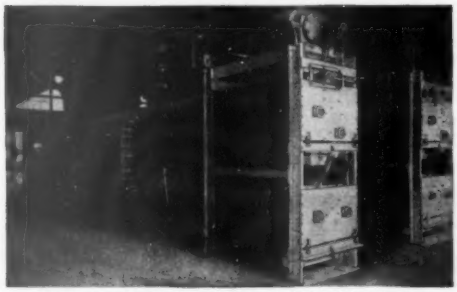
# Keep Heat Transfer Surfaces CLEAN...

SPECIFY

# Vogt

## SCRAPED SURFACE *Exchangers*

*DOUBLE PIPE UNIT. Drive end close-up of 12 section unit under test in our shop.



*SHELL and PIPE UNITS. Two of five units installed in a leading petroleum refinery.

*Patented

IF you are all "gummed up" with a tough heat transfer problem, Vogt Scraped Surface Exchangers will provide the answer. They have patented scraper elements which prevent fouling of the heat transfer surfaces and insure the highest rate of heat exchange between the product and the cooling or heating medium. The scrapers also continuously agitate the fluid and assist removal of solids from the unit.

**DOUBLE PIPE EQUIPMENT** is available in two types; EXCHANGERS, for cooling with water, brine, and cold filtrate, and for heating with steam or hot liquids; and CHILLERS, for use with volatile refrigerants such as ammonia, propane, and Freon. Both types have 8" jacket pipes and 6" inner pipes with scrapers.

**SHELL AND PIPE TYPE UNITS** are designed for use with volatile refrigerants and for heating fluids with steam or similar heating mediums. They consist of large welded shells each containing seven 6" scraped pipe sections.

Vogt Scraped Surface Exchangers serve profitably as oil chillers, crystallizers, and heaters in many processes in the petroleum and chemical industries. Their application to your heat transfer problems will receive the prompt attention of our Engineering staff.

*Write for Bulletin PE-1*

**HENRY VOGT MACHINE CO.**

**LOUISVILLE 10, KENTUCKY**

***Branch Offices:***

**NEW YORK • PHILADELPHIA • CLEVELAND • CHICAGO**

**ST. LOUIS • DALLAS • CHARLESTON, W. VA.**

# Hold that line!

Here, teamed up under the Metal Goods Corporation banner, are gathered the greatest names in fittings. You'll recognize them at a glance as leaders in their field.

**METAL GOODS CORPORATION STOCKS FITTINGS FOR TUBE AND PIPE OF EVERY TYPE . . . IN NON-FERROUS, STAINLESS AND HIGH NICKEL ALLOYS**

*If you are in need of tube fittings* for low, high pressure, or hydraulic lines—or if you have a fitting problem where vibration or corrosive action is involved . . . Metal Goods Corporation can give you immediate delivery on tube fittings in stainless, aluminum, brass and steel . . . *If you have a pipe fitting problem* in welding or screw types—or need flange or socket fittings or valves, Metal Goods Corporation can furnish them in aluminum, monel, nickel, inconel, stainless and brass.

Your Metal Goods Corporation representative is well qualified to help you in selecting the fitting that will give you the most dependable service at the lowest cost. If you want his technical assistance, call or write your nearest Metal Goods Corporation warehouse or sales service office. You will get prompt and courteous attention.

***Please call, wire, or write the following Metal Goods Corporation representative nearest you.***

**OFFICES AND WAREHOUSES**

**St. Louis 15, Missouri**
5239 Brown Avenue
Nelson L. Hower
Phone: GOodfellow 1234

**Kansas City 16, Mo.**
1300 Burlington
Frank D. Hogan
Phone: NOrclay 3516

**Tulsa 3, Oklahoma**
302 North Boston
Scott J. Harrison
Phone: 4-1173

**Houston 3, Texas**
711 Milby Street
Harris T. Gregg
Phone: CEntral 8881

**Denver 2, Colorado**
2425 Walnut Street
Neal Dehn
Phone: AComa 5891

**Dallas 9, Texas**
6211 Cedar Springs Rd.
Sam D. Hodgdon
Phone: ELmhurst 3271

**New Orleans 12, La.**
432 Julia Street
Carl T. Wademeyer
Phone: CAnal 7373

**SALES SERVICE OFFICES**

**Wichita, Kansas**
2200 East Central
Ray Noller
Phone: 7-8921

**Jackson, Mississippi**
781 Raymond Road
George E. Akerberg
Phone: 5-2711

**Decatur, Illinois**
1305 West Sunset
Arlie W. Tempel
Phone: 8-1314

**Baton Rouge, Louisiana**
4419 Mimosa Street
Paul P. Vidovic
Phone: 4-4738

**Indianapolis 2, Ind.**
1333 N. Pennsylvania
Harry L. Newton
Phone: Lincoln 4980

**Memphis, Tennessee**
713 Columbian Mutel Tower Bldg.
Robert W. Downs
Phone: 5-8721

**Omaha, Nebraska**
3515 No. 67th Avenue
C. M. Cooley
Phone: Walnut 1112

**Beaumont, Texas**
238 Bowie Bldg.
Lee T. Dodson
Phone: 4-7536, 4-7537

**Fort Worth, Texas**
3821 Carolyn
John M. Turbitt
Phone: FOrtune 4369

**San Antonio, Texas**
2012 Alamo Natl. Bldg.
Roy D. Bagaley
Phone: GArfield 3161

**Davenport, Iowa**
924 State Street
Robert L. Tharp
Phone: 2-3156

**METAL GOODS CORPORATION**

GENERAL OFFICES: ST. LOUIS 15, MISSOURI

# Get this Handy Desk-Size PAINT MANUAL!

## It's NEW... It's FREE!

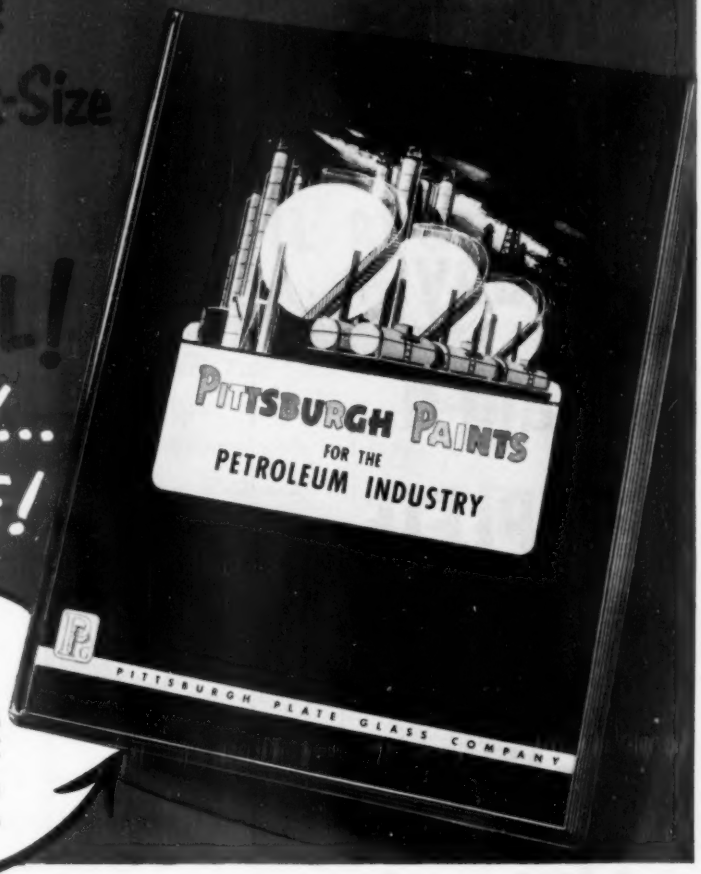



**Table of Contents Includes:**

1. **Product description.**
2. **Application recommendations.**
3. **Large-size color chips.**
4. **Inspection, surface preparation and painting of storage tanks.**
5. **General maintenance and painting suggestions.**
6. **Recommendations for painting automotive equipment.**
7. **How to use COLOR DYNAMICS painting system.**

PITTSBURGH has just issued a highly practical manual of information for those who buy and use paints in the petroleum industry.

● **This ready reference volume** contains complete descriptions of all Pittsburgh Paints for this field. These finishes are the finest it is possible to make. Their formulations are the result of the latest and best knowledge developed by Pittsburgh's large and skilled technical staff. Among its advancements are special *"Vitolized Oils"* and the process of molecular selection which have contributed so much to the exceptionally high-level performance of these coatings.

● **Also included** in this manual are numerous suggestions for proper application and maintenance. Many of these have been derived from Pittsburgh's long experience in supplying leading petroleum producers with high-quality finishes that have proved to be unusually successful in beautifying and preserving many types of surfaces.

● **By keeping this manual** handy you may be able to save time and money. We'll be glad to send you a copy without cost or obligation. Just fill out and mail coupon below, with one of your company's letterheads.

PITTSBURGH PLATE GLASS CO., Industrial Paint Div., Pittsburgh, Pa. Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Atlanta, Ga.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Dirzler Color Div., Detroit, Mich. The Thresher Paint & Varnish Co., Dayton, Ohio. Forbes Finishes Div., Cleveland, Ohio. M. B. Suydam Div., Pittsburgh, Pa.

*Send this Coupon For Your Copy TODAY*

Pittsburgh Plate Glass Company,
632 Duquesne Way,
Pittsburgh, Pa.

Please mail me copy of your handy reference manual, "Pittsburgh Paints for the Petroleum Industry."

Name_____

Street_____

City_____ State_____

**PITTSBURGH PAINTS**

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

# Q. Which is the ONLY company making a COMPLETE line of gasoline additives?

**A.** DU PONT is the only company making a complete line of gasoline additives! This line includes antioxidants, metal deactivator and gasoline dyes as well as tetraethyl lead antiknock compound.

Tetraethyl lead was first made commercially by a process developed by Du Pont in 1923 and, from that year until September 1945, Du Pont was the sole manufacturer of tetraethyl lead in the United States.

As in the case of TEL, all Du Pont additives are backed by a comprehensive technical service program. This program is brought to you by experienced representatives who are supported by the 5 thousand Du Pont personnel engaged in research and its administration.

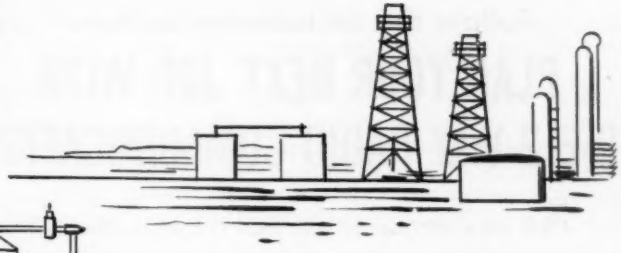
## Petroleum Chemicals

E. I. DU PONT DE NEMOURS & CO. (INC.) • Petroleum Chemicals Division, Wilmington 98, Delaware

# IT TAKES *Money* FOR OIL PRODUCTION

. . . Yes, Exploration, Drilling, Producing, Refining and Pipe Line operations cost plenty. National Bank of Tulsa's oil department is familiar with oil finance needs and is always ready to discuss them with oil men. The resources, facilities, and "know-how" are your guarantee of prompt, efficient, adequate service.

*See...* NATIONAL BANK OF TULSA NBT



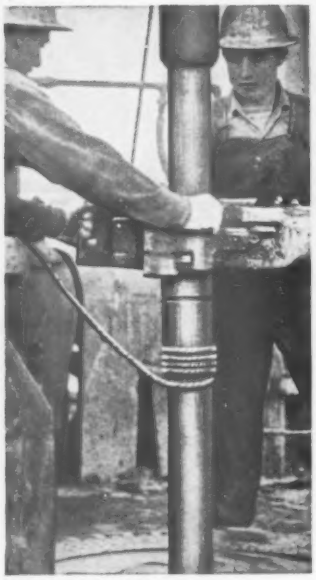
*The Oil Bank of America*

**NATIONAL BANK OF TULSA**

OFFERING COMPLETE BANKING AND TRUST SERVICES

Member Federal Deposit Insurance Corporation

**SPLIT-SECOND SUPERVISION.** With G-E 2-way radio you're always "on the job." Today, when operations must be regulated in order to produce oil products economically, instant communication can mean increased profits for large and small operators alike.



**CUT OPERATING COSTS.** Shutdowns must be kept to a minimum. You can depend on G-E 2-way radio to do just that! An expensive operating rig out of action for 2 hours would pay for low cost of a G-E radio unit. How much would instant communication save you?

**SPEED REPAIRS.** Every hour lost waiting for repairs cuts down on your volume and your profits. With G-E 2-way radio communication in your maintenance operation, pipeline damage can be quickly spotted...speedily repaired.

**ORDER EMERGENCY SUPPLIES.** Instant communication over great distances speeds supplies, keeps the job rolling. With G-E 2-way radio you eliminate useless travel time and increase the efficiency of your entire operation.

## Follow the oil industry leaders—

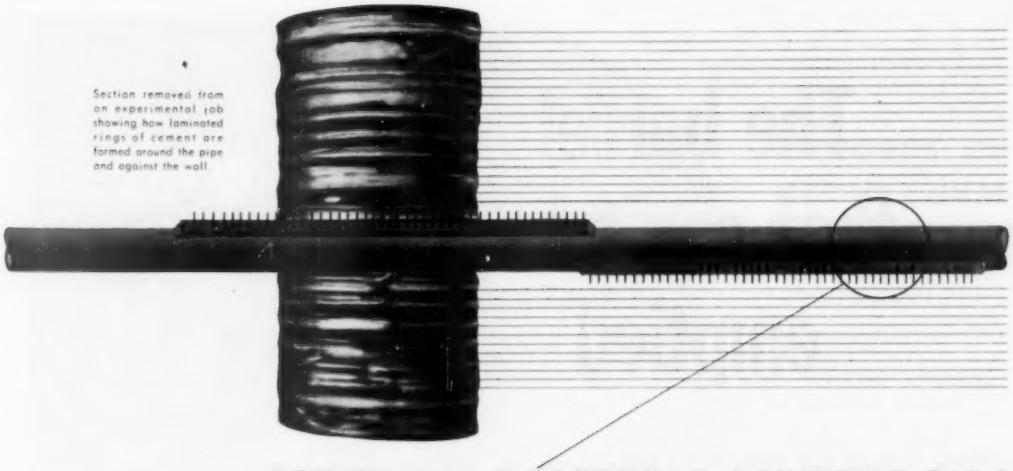
# PLAN YOUR NEXT JOB WITH G-E 2-WAY RADIO COMMUNICATION

Ask the CAS* man in your local G-E office about G-E communications equipment designed for use in the oil industry. Or, write us direct: *General Electric Company, Section 8102-20, Electronics Park, Syracuse, N. Y.*

*Communications Advisory Service

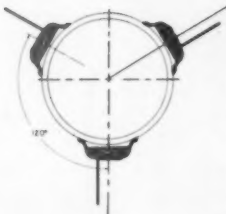
*You can put your confidence in—*

**GENERAL ELECTRIC**



Section removed from an experimental job showing how laminated rings of cement are formed around the pipe and against the wall.

# MINIMIZE REMEDIAL SQUEEZE JOBS with HALLIBURTON'S ROTO-WALL CLEANERS




**ROTATING SPIKES ASSURE A BETTER, SAFER CEMENT BOND** . . . Highly effective in centering the casing, Halliburton's exclusive method of rotating spring-steel spikes cuts out mud cake, cleans the wall behind the pipe in horizontal grooves with no vertical channeling. This principle assures you of excellent bond regardless of the initial clearance between pipe and wall. The staggered spikes permit a clear passage in the annular space, give you more equal distribution of cement.

**360° ACTION** . . . Each five foot section is armed with triple-coiled, spring-steel spikes. No bending – no breaking! The number and the arrangement of sections is as flexible as the job requires.

**CASING SWIVEL** . . . The only extra equipment required is a Halliburton Casing Swivel which features a special locking arrangement to prevent back off when in use.

**YOU SAVE MONEY IN EVERY WAY!** . . . Rugged, long-life construction and the fact that only one size serves all casing jobs saves money from the start. Simple tack welding speeds the job. And with better cementing assured, future remedial cementing is minimized. Buy the wall cleaners developed by the world's most experienced cementers. Contact your nearby Halliburton Representative now, or write Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

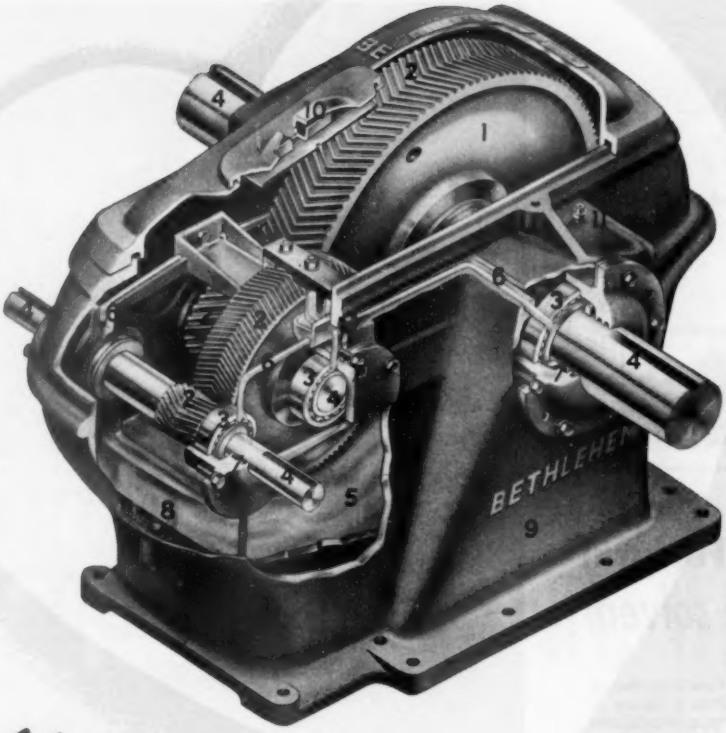
YEARS AHEAD IN CEMENTING SERVICE

# The barrel that can't be emptied

***Many a man can remember*** reading by kerosene lamp. For however fast time speeds by, it hasn't been very long since lamps played an important part in lighting the homes of the West and Standard was a small company proud of its ability to get from 5 to 10 gallons of its principal product, "coal oil," from a barrel of petroleum.

***Count a few of the products*** made from oil today! Almost every item pictured above comes directly or indirectly from oil: (1) the enamel on stove, refrigerator and cabinets, (2) the dryer in the wall paint, (3) the plastic in the clock cover, curtains, apron, (4) the linoleum, (5) the drainboard covering at the sink, (6) the detergents used in washing—(7) the finish on the car and (8) the synthetic rubber of its tires. ¶ Add to these asphalt for paving and roofing, insecticides, cosmetics, dry cleaning solvents...and, of course, steadily improving gasolines and motor oils...and you begin to see how important oil has become. ¶ More than 1100 products are now being made from petroleum by Standard, and others are on the way. We have spent $35,000,000 in research and technical service in the last 5 years alone...to make a barrel of oil truly "a barrel that can't be emptied" in terms of the good things it contributes to your daily living.

**STANDARD OIL COMPANY OF CALIFORNIA** ***plans ahead to serve you better***




## FEATURES OF BETHLEHEM SPEED-REDUCER

1—Forged-steel gears
2—Precision-cut herringbone teeth
3—Roller bearings throughout
4—Extra-heavy shafting
5—Oversize oil capacity
6—Full-flow oil channels
7—Labyrinth-type oil seals
8—Large settling chamber
9—Rigid one-piece semisteel casting
10—Renewable filter-type breather
11—Dip-stick gage

# *Here's the strong, sturdy HEART of Bethlehem Pumping Units*

The gear box of a pumping unit is the heart of the system. That is why Bethlehem has spent many careful years in engineering the gear box of Bethlehem pumping units, making it strong and smoothly-functioning for years of successful operation.

Study the features of the cutaway drawing. They show many details of the careful planning, the expert engineering, that characterize this speed-reducer. Note especially the lubrication system; how directly and completely it floods every bearing and gear. And note, at the same time, the basic simplicity of the system. No complicated doodads, no trouble-inviting gadgets.

Forgings, castings, and machining are all products of an integrated Bethlehem plant set-up that enables us to keep close check on every step of manufacture. The unit is made with a care and precision that assure an effective job on the well; effective, smooth, and economical.

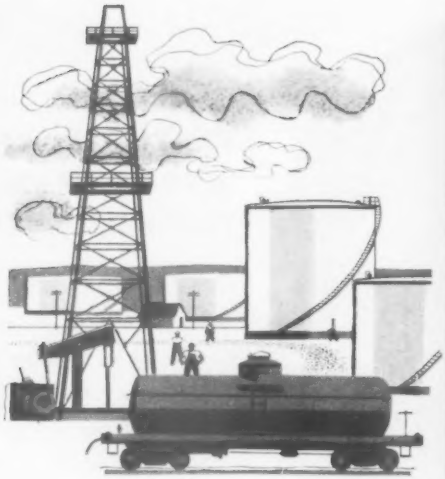
The same proved features of design are available throughout the entire range of Bethlehem pumping units . . . from the small 10,000-in.-lb size to the 640,000-in.-lb giant. Like to look 'em over for yourself? Arrange it by calling the Bethlehem Supply office nearest you.

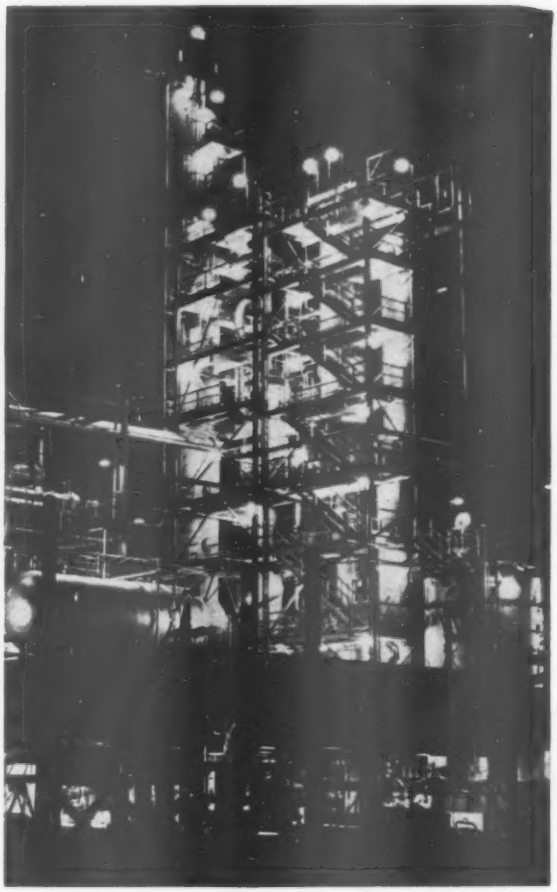
In addition to its manufacturing plants and its sales and engineering service, Bethlehem Supply Company maintains stores throughout the Rocky Mountain, Midcontinent, Southwestern, and California oil fields. There are almost 50 of these modern, up-to-the-minute stores, all fully stocked to meet local requirements.

**BETHLEHEM SUPPLY COMPANY**

*General Offices: 21 E. Second St., Tulsa, Okla.*
*West Coast Headquarters: Los Angeles, Calif.*
*Export Distributor: Bethlehem Steel Export Corporation*
*25 Broadway, New York, N. Y.*
*Canadian Representative: Rocky Mountain Supply Co., Ltd., Calgary, Alberta*

BETHLEHEM STEEL





*Photograph by John Trauger—"The Sohioan."*

# Quaker Oats Furfural as a *selective solvent*

As a selective solvent furfural is producing high quality lube oils from a variety of crude stocks. The numerous installations here and abroad demonstrate the advantages of the operation, both technical and economic. Process information, engineering data, and test results on various oils are available from the licensor of the process.

Here are some facts about furfural itself useful in evaluating the solvent we supply.

**1. SAFETY**—Furfural is relatively non-toxic, hence introduces no unusual health hazard.

**2. FREEZING**—The low freezing point (—34°F) virtually eliminates danger of solidification in lines or equipment.

**3. STABILITY**—Furfural has extremely good heat stability (see Ind. Eng. Chem. *32*, 1639 (1940) ). This stability is emphasized by low operating losses in commercial units all over the world.

**4. COST**—A unique record of less than 1.5c per pound increase in price of furfural in last five years.

**5. SUPPLY**—Furfural is readily available from an unfailing source, for which nature creates abundant supplies of raw material each year.

**6. DENSITY**—A high density (1.160 at 68°F) plus low surface tension (49 dynes/cm. at 68°F) permits rapid phase separation.

**Quaker Oats Bulletin 203—"Physical Data on Furfural"—contains comprehensive data, tables and curves on the physical characteristics of furfural. Obtain a copy from the nearest office listed below.**

**The Quaker Oats Company** CHEMICALS DEPT.

**339D The Merchandise Mart, Chicago 54, Illinois**
**Room 539D, 120 Wall St., New York 5, N. Y.**
**Room 439D, P. O. Box 4376, Portland 8, Oregon**

**In San Francisco:** The Griffin Chemical Company • **In the United Kingdom:** Imperial Chemical Industries, Ltd., Billingham, England
**In Europe:** Quaker Oats-Graanproducten N. V., Rotterdam, The Netherlands; Quaker Oats (France) S.A., 42, Rue Pasquier, Paris 8e, France
**In Australia:** Swift & Company, Pty., Ltd., Sydney • **In Japan:** F. Kanematsu & Company, Ltd., Tokyo

# YOU CAN ARGUE QUALITY ON THE SURFACE BUT IT'S PROVED AT THE BOTTOM OF THE WELL

***There's an Axelson pump for every specific well condition***

Ask your Axelson service man

*Chosen first... to last!*

# AXELSON

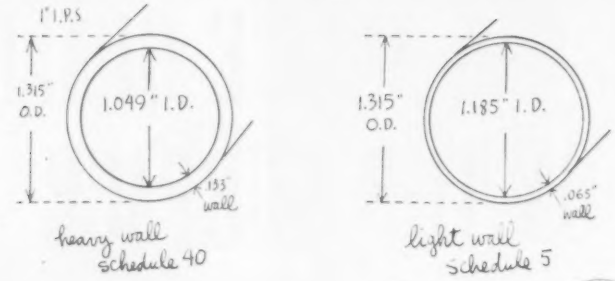
PETROLEUM PUMPING EQUIPMENT

65th YEAR

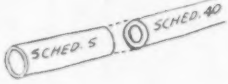
THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

AXELSON MANUFACTURING CO. • PLANTS — Los Angeles 58, California; St. Louis 16, Missouri. OFFICES — New York City 7, New York; Tulsa 1, Oklahoma; Buenos Aires, Argentina. DISTRIBUTORS — Jones & Laughlin Supply Co.; Great Northern Tool & Supply Co.; Industrial Agencies, Ltd., San Fernando, Trinidad, B. W. I.; Industrias Waldrip & Campbell, Barcelona, Caracas and Maracaibo, Venezuela; South American Supply Co., Ltd., Lima, Peru; Sociedad Comercial de Materias Primas Limitado, Rio de Janeiro, Brazil; G. Saavedra e Hijos, S. de R. L. Avenida Morelos 31, Mexico, D. F.; Dominion Oil Field Supply Co., Ltd., Calgary, Canada.

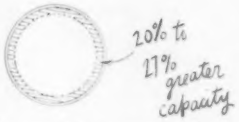
# here's what you gain with stainless schedule 5 pipe



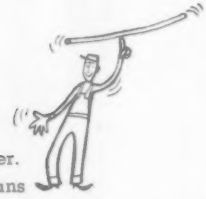
You save money. Schedule 5 pipe costs about half as much per foot as Schedule 40.



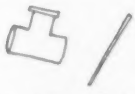

Schedule 5 has the same O.D. as Schedules 10, 40 and 80 —for hook-up with existing lines as well as for new installations.



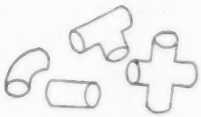

Its larger I.D. increases flow and capacity in pipelines, exchangers and other equipment.



It's lighter. This means quicker and easier installation.



You can save substantially on valves, fittings, weld rods, etc., because smaller O.D. material can frequently be used. Tubing sizes can now be replaced with light wall pipe . . . for ready hook-up with standard valves, pumps, and other equipment normally manufactured in pipe sizes.



Fittings as well as stocks of Schedule 5 pipe are carried by conveniently located Carpenter distributors.

***Specify Schedule 5 pipe . . . it saves dollars . . . and makes a lot of sense!***

**THE CARPENTER STEEL COMPANY**
**Alloy Tube Division, Union, N. J.**
Export Dept: The Carpenter Steel Co., Port Washington, N.Y. "CARSTEELCO"

*Data Sheets* give you complete information about Carpenter Schedule 5 Stainless Pipe. Write for your personal copy.

THE U.S. NEEDS YOUR STEEL SCRAP NOW

# *Carpenter*

## STAINLESS TUBING & PIPE

Analysis · Tolerance · Finish

**- guaranteed on every shipment**

# Perfect example

Here is a perfect example of a business in which the service is as important as the product, itself.

There is nothing in the book to stop you from packaging all your lubricants and saying to the car owner: "Here's your grease and oil—put 'em in yourself!"

However, mighty little oil business is done that way. The reason—your business is essentially a *service* business.

So is ours.

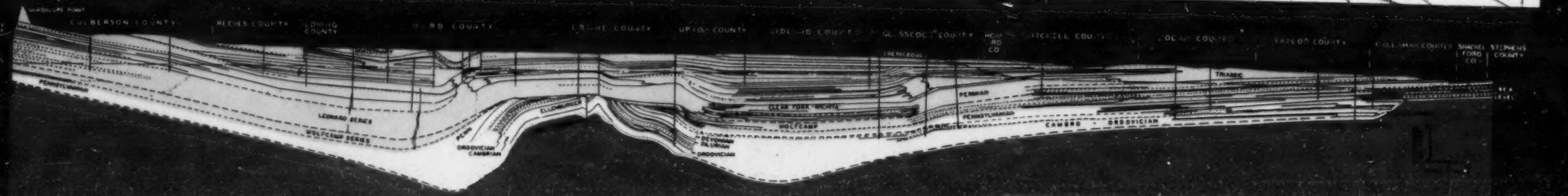
'Way back in 1925 Ethyl people realized that if antiknock compound was ever going to be of great value to petroleum refiners, it had to be accompanied by broad-gauge service. So, over the years, Ethyl has developed many programs of service to the petroleum industry.

(*Continued on next page*)

Printed in U. S. A.

# Journal-guide to PERMIAN BASIN

LOVING
REEVES
PECOS
WARD
CRANE
UPTON
MIDLAND
GLASSCOCK
REAGAN
IRION
STERLING
MITCHELL
CROCKETT
Ranche (under Construction)
Humble & Shell
Humble
Shell
Atlantic
Gulf
El Paso
Magnolia
Texas-New Mexico
Southern Union
LEGEND
OIL FIELD
GASOLINE PLANT
REFINERY
CRUDE-OIL PIPE LINE
NATURAL-GAS PIPE LINE
MAJOR HIGHWAYS
Base by permission Midland Map Co.
Supplement to THE OIL AND GAS JOURNAL, Vol. 51, No. 24.
Copyright, The Oil and Gas Journal, Tulsa, Okla.


CULBERSON COUNTY
REEVES COUNTY
LOVING COUNTY
WARD COUNTY
CRANE COUNTY
UPTON COUNTY
MIDLAND COUNTY
GLASSCOCK COUNTY
MITCHELL COUNTY
COLEMAN COUNTY
TAYLOR COUNTY
CALLAHAN COUNTY
SHACKELFORD COUNTY
STEPHENS COUNTY
CRETACEOUS
TRIASSIC
PERMIAN
CLEAR FORK - WICHITA
WOLFCAMP
PENNSYLVANIAN
CANYON
CAMBRO - ORDOVICIAN
ORDOVICIAN
DEVONIAN
SILURIAN
ELLENBURGER
LEONARD SERIES
WOLFCAMP SERIES
PENNSYLVANIAN
ORDOVICIAN CAMBRIAN

## Perfect example

(*Continued from preceding page*)

Ethyl services have contributed to every field in which the power of gasoline is utilized—passenger cars, truck and bus fleets, farm tractors and aviation. Our research laboratories have cooperated with oil companies in solving the inter-related problems of fuels, engines and lubricants. Year after year our gasoline testing centers have prepared detailed surveys of gasoline characteristics and made them available to refiners. Powerful advertising and merchandising assistance has been provided to help increase the sale of both premium and regular leaded fuels. Our safety division has worked out methods and equipment for the safe handling of gasoline through all stages of blending and distribution.

And having pioneered all these services, it is natural that Ethyl looks to their continuance on even a greater scale in the future. You can be sure that we will always regard *service* as important as product . . . and maybe even more so!

**ETHYL CORPORATION**

**NEW YORK 17, NEW YORK**

*Ethyl service is backed by 29 years of antiknock experience*

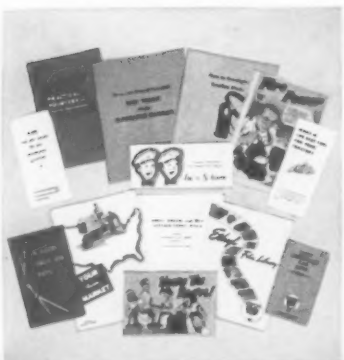
RESEARCH

SALES HELPS

SUPPLY SERVICE

ROAD TESTING

TECHNICAL REPORTS

GASOLINE TESTING

# Steel

BULWARK OF FREEDOM BUT . . .

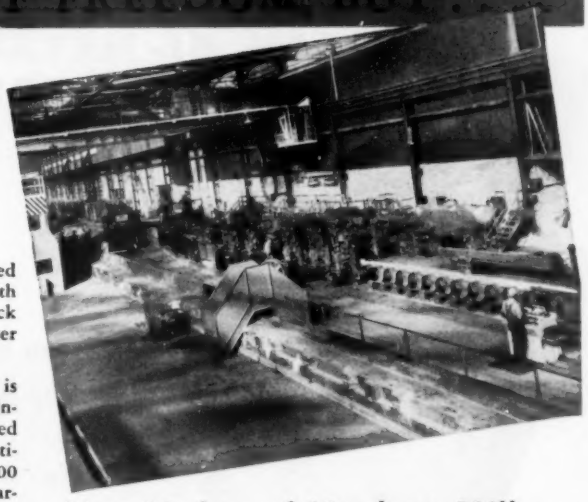
## *Vulnerable* to Socialistic Rust!

Urged on and on by the incentives afforded by our free enterprise system—Americans, with the private money of thousands of stock holders, have built a Bulwark of Steel greater than all the rest of the world.

The capacity of America's steel industry is so great that in 24 hours, it can turn out ingots and castings sufficient to provide finished steel for—500 airplanes, 500 tanks, 1,000 anti-aircraft guns, a half million 3-inch shells, 1,000 howitzers, 2,000 aerial bombs, 1 aircraft carrier, 2 heavy cruisers, two cargo ships, two tankers, 1,000 freight cars, 2,000 trucks, 12,000 automobiles, 20,000 refrigerators, 20,000 stoves, 2,000 homes, and still have 23,000 tons of steel for other purposes.

Remove the incentives of free enterprise or burden it with excessive restrictions and our magnificent steel industry will be vulnerable to the wasting erosion of socialistic rust.

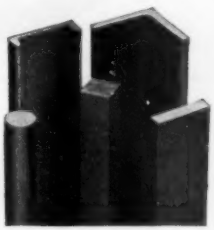
SHEFFIELD
STEEL
CORPORATION
HOUSTON KANSAS CITY
TULSA
SUBSIDIARY OF ARMCO STEEL CORPORATION



## *Most Modern of Merchant Mills*

On this highly mechanized 12-inch merchant mill, steel billets are more efficiently rolled into a wide variety of merchant shapes and sizes vital to manufacturing.

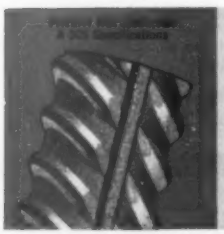
It is a typical example of the continuing modernization and expansion program of Sheffield Steel which, in the last ten years alone, has more than tripled the at-home steel making capacity of Sheffield Steel mills. New furnace and blooming mill capacity now under construction will enable Sheffield Steel to continue to pace industrial progress with an ever increasing supply of steel—the vitamin A of industrial growth.



SHEFFIELD
MERCHANT STEEL

There are few industries that do not use merchant steel. Sheffield Steel mills roll a wide variety of bars and shapes.

DISTRICT SALES OFFICES: Chicago, Ill.; St. Louis, Mo.; Des Moines, Ia.; Omaha, Nebr.; Wichita, Kans.; Denver, Colo.; Oklahoma City, Okla.; Tulsa, Okla.; Dallas, Tex.; San Antonio, Tex.; Lubbock, Tex.; New Orleans, La.; Shreveport, La.

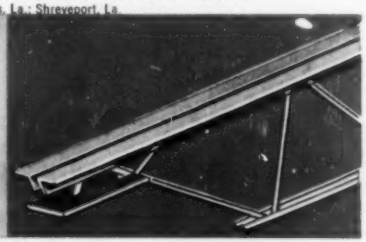


## SHEFFIELD

**STEEL PRODUCTS OF ADVANCED DESIGN FOR MODERN CONSTRUCTION**

The patented crescent shaped deformations of Sheffield Crescent Reinforcing Bars increase the bond of concrete to steel—contribute to economies in both design and construction.

The design and construction of Sheffield Steel Joists makes possible the supporting of more floor or roof area per ton of material in many types of structures.



*Sheffield Products:* Carbon and Alloy Steel, Ingots, Blooms, Billets, Plates, Sheets, Hot Rolled Bars, Steel Joists, Structural Shapes, Reinforcing Bars, Welded Wire Mesh, Wire Products, Wire Rods, Fence, Spring Wire, Nails, Rivets, Grinding Media, Forgings, Track Spikes, Bolt and Nut Products

MORE SCRAP MEANS MORE STEEL • TURN YOURS IN TODAY!

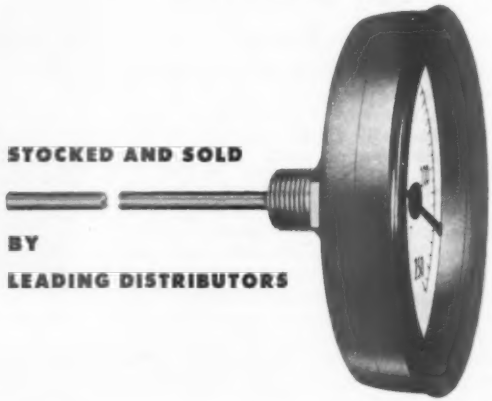
FOR EASY-TO-READ "ON THE SPOT" TEMPERATURE INDICATION, CHOOSE

# *Accurate* AMERICAN BI-METAL DIAL THERMOMETERS

**STOCKED AND SOLD**

**BY**

**LEADING DISTRIBUTORS**



SPECIFIC NEEDS of refinery, chemical, power and other plants are met completely by American Bi-Metal Dial Thermometer. It makes accurate "on the spot" temperature readings easy *even from a distance.* It can be used where other types are not nearly so practical — and to avoid the higher cost of a distant reading thermometer. Installation is simple, fast and economical — only a ½" or ¾" N.P.T. tapped hole is required.

The fixed stem contains the highly sensitive bi-metal element. Accuracy of the instrument is guaranteed within 1% of the scale range. In extensive laboratory and field tests, sudden hot blasts, submersion, severe mechanical and thermal shocks, hot gases, dust and long exposure to the elements could not impair its accuracy or destroy the hermetic seal of the case.

Solve your "on the spot" temperature reading problems with rugged, accurate American Bi-Metal Thermometers. Two dial sizes, seven stem lengths, a wide range of temperatures, and the availability of separable sockets make selection easy. Get all the facts. Write for Bulletin 144.

## SPECIFICATION DATA

**Temperature Ranges:** from minus 60° to 120°F., 200° to 1000°F. **Dial Sizes:** 3½" and 5". Graduations over full 270° arc. **Bezel:** Screwed to case. **Front:** Heavy plate glass set in channelled gasket — hermetically seals the case. **Pointer:** Adjustable type attached with set screw; easy to get at for setting. **Stem:** Stainless steel, ¼" diameter — lengths from 2½" to 24". Stem and connections welded — strong, corrosion resistant, leak-proof. **Connection:** Fixed, ½" N.P.T.

**Separable Sockets** available for use on closed systems or where the measured medium is corrosive to the stainless steel stem. Fit over all standard stem lengths except 2½".

**AMERICAN INDUSTRIAL INSTRUMENTS**

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'AMERICAN' INDUSTRIAL INSTRUMENTS, 'HANCOCK' VALVES, 'ASHCROFT' GAUGES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES. BUILDERS OF "SHAW-BOX" CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.

# Few Axelson Pumps Here!

NEVER JUNK AN AXELSON

The chances are you will never have occasion to junk an Axelson Bottom Hole Pump. When an Axelson does eventually wear you can have it overhauled at one of our nearby pump repair shops, and pick it up as good as new. Parts are always available.

Jones & Laughlin Supply men in any producing field accumulate a wealth of helpful, factual information, and Axelson pumping equipment particularly adapted to local conditions is always in stock.

Jones & Laughlin Supply Company

J&L STEEL

Subsidiary of Jones & Laughlin Steel Corporation

EXPORT: 405 Lexington Ave., New York, N. Y., U. S. A.

88 STORES • 19 OFFICES • 9 RESIDENT SALESMEN

*General Offices:* TULSA, OKLAHOMA

EARL L. MANNING *has been a Party Chief with Independent for 9½ years. With the Company for 18 years, he has progressed through virtually every job on a field party, and has a total of 24 years of experience in geophysical work.*

## Only Seasoned Men can provide the experienced service you get from Independent

Founded in 1932, Independent Exploration Co. is one of the oldest exploration contractors in the industry operating continuously under the same ownership and management. And Independent ranks high in the individual experience terms of the men who serve you, a factor responsible in a large measure for the success and value of any geophysical survey.

You are invited to avail yourself of Independent's experienced organization whenever we can be of service.

POINTING THE WAY FOR THE DRILL

IXC

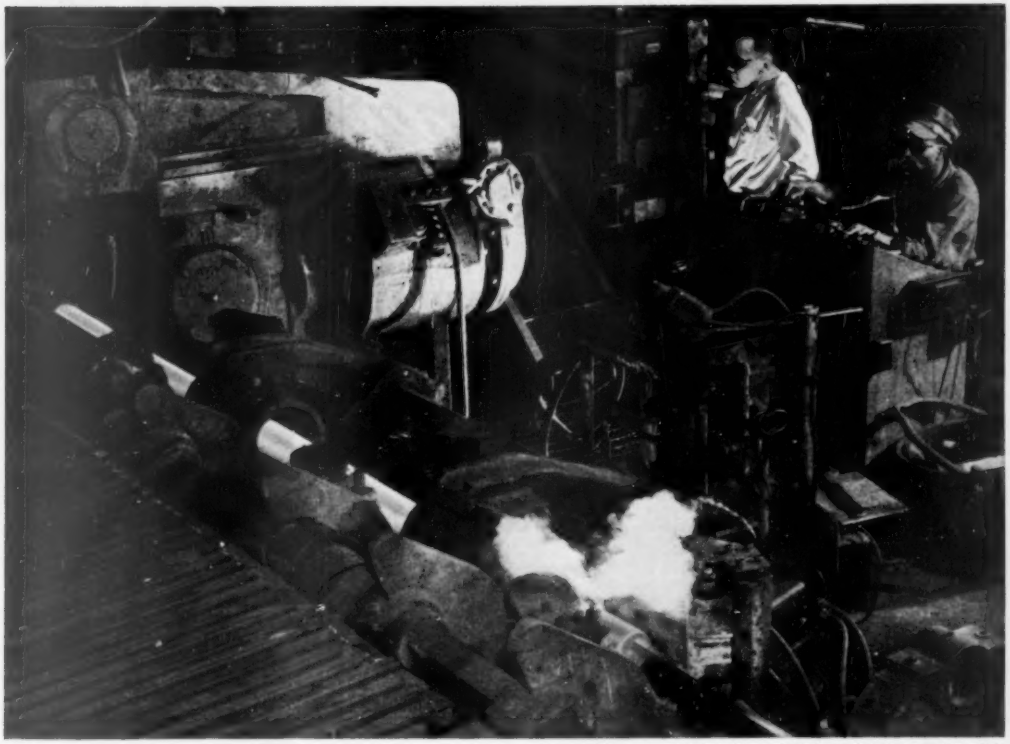
**Independent** *Geophysical Surveys*

**EXPLORATION COMPANY**

1973 WEST GRAY ★ HOUSTON, TEXAS

ESTABLISHED 1932

# Quality begins with the billet . . .



Here is one of the highly specialized manufacturing operations that insure Globe quality — piercing the billet to form a seamless tube.

## only GLOBE welding fittings receive continuous specialized process control from billet, to tube, to fitting

The quality of any welding fitting cannot exceed the quality of the tube from which it is fabricated.

Only Globe — among manufacturers of fittings — produces its own seamless tube. *Specialized* processes at every stage of manufacture — from billet . . . to tube . . . to fitting — insure uniform high quality. Rigid inspection and continuous laboratory controls guarantee strict conformity to rigid specification.

Moreover . . . *you can get these high-quality fittings now* — when you need them. Just get in touch with your nearest Globe Sales office.

For complete information on the finest welding fittings available anywhere, send for the Globe Welding Fittings Catalog.

GLOBE STEEL TUBES CO., Milwaukee 46, Wisconsin

**Chicago • Cleveland • Detroit • Houston • New York • Philadelphia St. Louis • Denver • San Francisco • Glendale, Cal.**

Producers of Globe seamless stainless steel tubes — Gloweld welded stainless steel tubes — alloy — carbon — seamless steel tubes — Globeiron (high-purity ingot iron) seamless tubes — Globe Welding Fittings.

# *Announcing*

## THE IMPROVED STANDARD AXELSON LONG STROKE PUMPING UNIT

The profit producing advantages of the Axelson Hydraulic Long Stroke Unit are now intensified by improvements in design and construction. Now available to the petroleum operator, is the Improved Standard Model incorporating the following:

- Self-aligning, self-lubricating, spring loaded stuffing box eliminates the possibility of over tightening and burning the packing.
- Engineered fluid flow pattern in reverse valve mechanism provides minimum turbulence and reduces fluid friction losses.
- Unit is integral and requires no outside connections other than fuel lines.
- Base tripod is wider and higher, allowing a higher break out point and ample room for servicing well-head.
- Scavenger tank is integral with main base and has been appreciably increased in volume for storage capacity.
- Main control valve is actuated hydraulically through a centrally located control panel.
- "O" ring seals are used extensively to replace gaskets thereby assuring drip-proof joints in cylinder sections, etc.
- Where possible, welded and flanged pipe connections have replaced threaded joints in pressure lines.
- Spherical tank of sufficient capacity has replaced the vertical fluid tank and eliminated the horizontal balance tank thus reducing foundation requirements and hence installation costs.
- Reversals at top and bottom are actuated hydraulically through a unitized pilot and reverse valve assembly, permitting stroke length adjustment at both ends of cycle.
- Shorter main drive belt centers, providing less drive h.p. loss.

An Axelson engineer is at your service for discussion of any specific pumping problem.

*Axelson*

*PETROLEUM PUMPING EQUIPMENT*

OUR 60th YEAR

THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

*CHOSEN FIRST...TO LAST!*

AXELSON MANUFACTURING CO. • 6160 SOUTH BOYLE AVENUE • P.O. BOX NO. 15335, LOS ANGELES 58, CALIFORNIA

## *Oil makes her a sportswoman . . .*

Instead of working all of her afternoons away in her home — the way her grandma and mother had to — this young housewife has time for outdoor exercise and recreation. She has this time because she has many conveniences that ease and speed her chores — washing machine, vacuum cleaner, automobile, oil heat, detergents — to list just a few. Each one of these conveniences — and hundreds more that simplify the work of living — has been made possible through the progress of the petroleum industry. The Texas Company has played a distinguished part in this progress — and is constantly searching for new ways to put oil to work — to help improve the standard of living for all the world.

*The Texas Company*

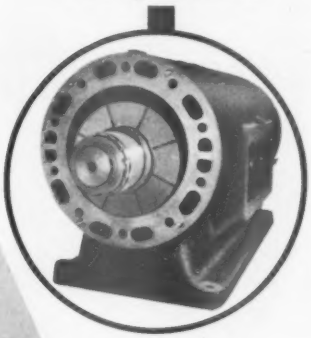
TEXACO

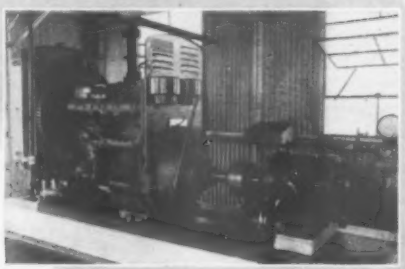
*Faithfully yours* 1902 | *for Fifty Years* 1952

# gas gets a better boost

when
**FULLER**
gets in
the picture

Five two-stage gas boosters, each handling 1,770,000 SCFD from 10 to 120 psig, at 800 rpm, V-12 Climax gas engine drive.





Single-stage gas booster, handling 2,400,000 SCFD from 150 to 250 psig, at 870 rpm, Waukesha gas engine drive.

Consider Fuller Rotary Compressors in the overall picture of your operations. In booster work, whether for field boosting or to trunk-line levels, you'll find these compressors doing a better job . . . better because they reduce maintenance cost, cut inspection time, last longer, do the job efficiently.

Pulsations and vibrations, valves and complicated parts are eliminated by multi-vane rotary construction. Moving parts are few . . . rotor, blades, bearings. Blades automatically compensate for wear, maintaining full capacity for the life of the machine. These features explain why Fuller boosters do an outstanding job wherever gas is handled.

If you're interested in getting maximum efficiency and economy into your operation, investigate the Fuller Rotary. Send for a copy of Bulletin C-6, containing detailed description of these machines.

Single-stage gas booster handling 3,560,000 SCFD, from 15 to 45 psig, V-12 Climax gas engine drive through gear speed reducer.

Two two-stage gas boosters, each handling 1,500,000 SCFD, with atmospheric inlet pressure, or 2,500,000 SCFD, 10 psig inlet pressure, can be handled, compressing to 70 psig discharge.

FULLER COMPANY, Catasauqua, Pa.
Chicago 3—120 So. LaSalle St.
San Francisco 4—420 Chancery Bldg.

C-222
1814

**Fuller**

PIONEERS OF HIGH-EFFICIENCY VANE-TYPE ROTARY COMPRESSORS

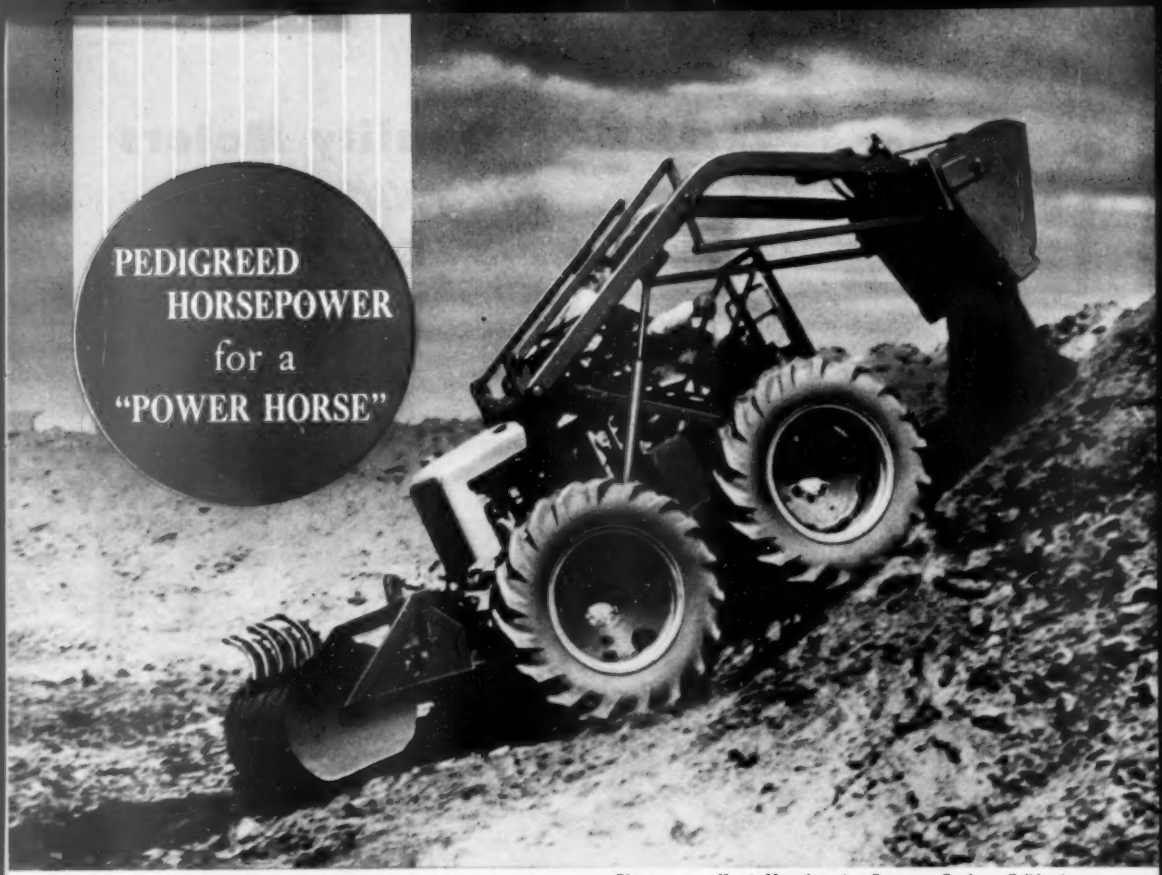
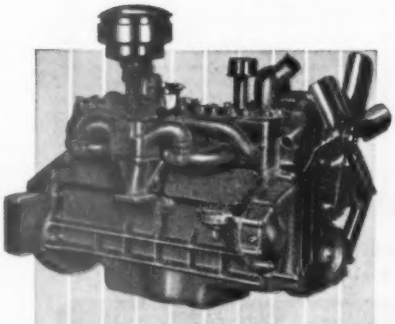



*Photo courtesy Harris Manufacturing Company, Stockton, California*

## *Want to scoop out a big reservoir in record time?*



Building a reservoir means moving a great many tons of earth. Here you see a Chrysler-powered four-wheel-drive tractor doing the job. Scraping . . . scooping . . . piling up ton after ton of earth . . . forward and reverse . . . high speed and low speed . . . hour after hour, day after day.

It is equipped with level-lift three-quarter yard bucket, suspension hitch and a seven-foot chisel scraper. A real test for an engine with 230 cu. in. displacement! Yet the Chrysler Industrial Model 6-A supplies unwavering power. One more example of the outstanding, sometimes almost unbelievable performance of Chrysler Industrial Engines.

Mammoth engine building facilities and Chrysler engineering provide everything you need to better meet widely varied requirements. For example, an engine can be built with standard, fungus-treated or corrosion-resistant electrical system . . . propane or natural gas burning carburetor . . . standard or special dust-resistant air cleaner . . . three, four or five speed transmission . . . standard or gyrol fluid drive.

Yet Chrysler Industrial Power is not expensive. Production-line methods, adapted to specialized industrial engine building, provide custom-built industrial engines at mass-production prices.

A Chrysler Industrial Engine Dealer will be glad to recommend one of the nine basic Chrysler Engines for your job. If your problem is special, write: ***Industrial Engine Division, Chrysler Corporation, Trenton, Michigan.***

# CHRYSLER

## *Industrial Engines*

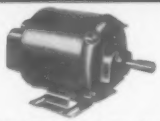
**HORSEPOWER** **WITH A PEDIGREE**

Wagner
ELECTRIC MOTORS
...the choice of leaders in industry

# Wagner Quality Motors for your product or your plant

When you select a motor from Wagner's complete line, you get a motor that is completely dependable in its specific application. You can choose from a wide variety of types and sizes. Here are a few of the motors in the Wagner line. At right is TYPE RP—open type polyphase squirrel-cage motor. It is drip-proof and suitable for all general purpose applications. 1/6 to 400 hp.

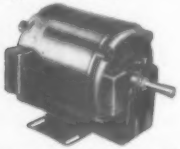
## SINGLE-PHASE



TYPE RB—*Split-phase Induction. For easy starting applications with high starting current. 1/20 to ⅓ hp.*

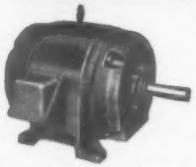
TYPE RK—*Capacitor-Start Induction. For general purpose applications requiring high starting torque—normal starting current. 1/6 to 3 hp.*

TYPE RG—*Repulsion-Induction. For high starting torque applications involving a very long starting period. 1 to 5 hp.*



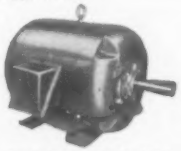
TYPE RA—*Repulsion-Start Induction. For general purpose applications with high starting torque—low starting current. ½ to 15 hp.*

## POLYPHASE MOTORS

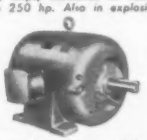


TYPE XP—*Splashproof. Protected against splashing or dripping liquids. ¾ to 200 hp.*

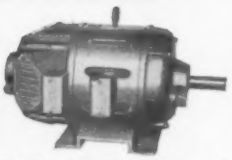
TYPE TP—*Totally-enclosed, non-ventilated. Fully protected. ¼ to 15 hp.*



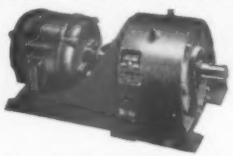
TYPE CP—*Totally-Enclosed Fan-Cooled. Protected against dirt, chips, abrasives or fumes. Steel frame. 1 to 250 hp. Also in explosion proof type HP.*



TYPE EP—*Corrosion-resistant Totally-Enclosed Fan-Cooled. Cast iron frame. 2 to 250 hp. Also available in explosion proof type JP.*



TYPE RS-1—*Wound Rotor. Constant or adjustable varying speed. 1 to 250 hp. TYPE RS-2 for intermittent service. 2 to 200 hp.*



GEAR MOTORS—*Single-phase or Polyphase. Open or enclosed types. 1/20 to 50 hp.*

DIRECT CURRENT MOTORS—*Companion line to Wagner A.C. Motors. 1/6 to 3 hp.*

* * *

In addition to a complete line of motors, Wagner also furnishes Increment Type Motor and Starter Combinations, Jet Pump Motors and a complete line of Transformers: Dry-type, Distribution and Power. Wagner engineers welcome an opportunity to serve you. Consult the nearest of 32 Branch offices, or write direct.

Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6389 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS · TRANSFORMERS · INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS · AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

# The Mark of Sound Refinery Engineering

THIS is the mark of McKee engineering. To oil men all over the world it means sound process and plant design, thorough, efficient engineering and construction. It is backed by an organization with the integrity and experience, the scope and resources to undertake your refinery project and fulfill the promise that *McKee Engineering means assured results.*

**DESIGN, ENGINEERING AND CONSTRUCTION FOR THE PETROLEUM REFINING AND IRON AND STEEL INDUSTRIES**

McKee Engineering

## Arthur G. McKee & Company • Established 1905

*Headquarters:* McKee Building, 2300 Chester Avenue, Cleveland 1, Ohio. *New York Office:* 30 Rockefeller Plaza, New York 20, N.Y. • *Washington Office:* 1507 M Street, N. W. Washington, D. C. • *England:* The Iron and Steel Division of Arthur G. McKee & Company is represented by Head, Wrightson & Company, Ltd. *District Engineering Offices:* Union, New Jersey and Tulsa, Oklahoma.

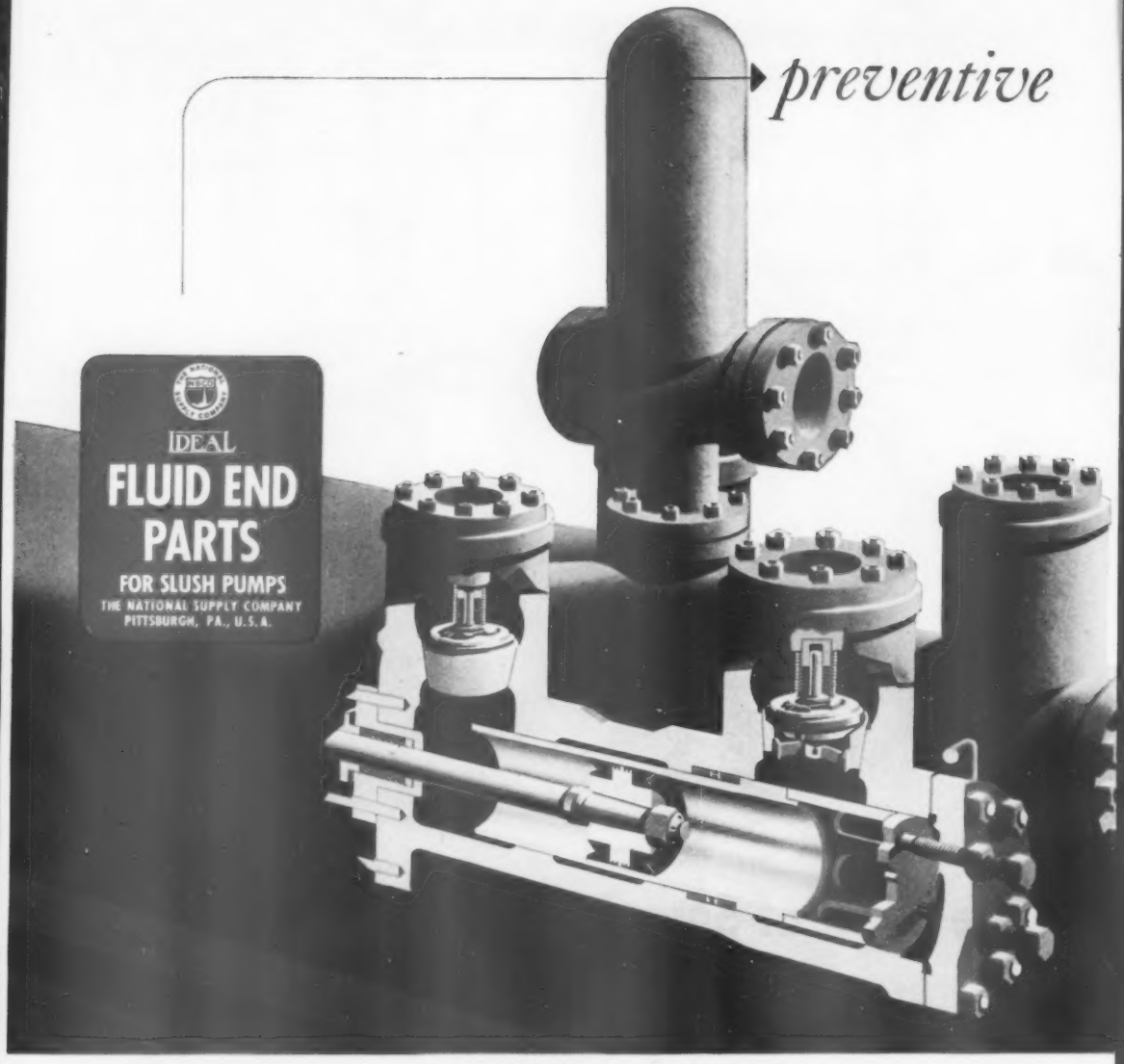
*preventive*

IDEAL

# FLUID END PARTS

## FOR SLUSH PUMPS

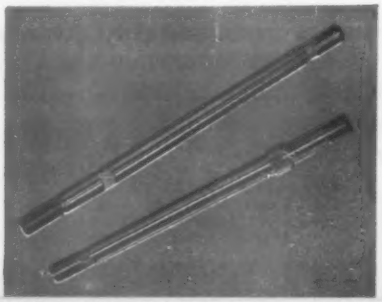
THE NATIONAL SUPPLY COMPANY
PITTSBURGH, PA., U.S.A.

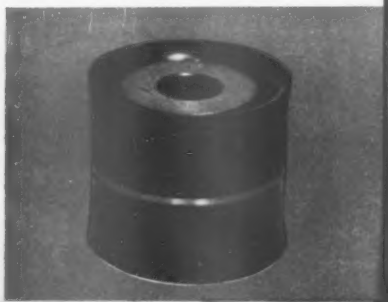


**Ideal Fluid Rod Packing:** Versatile, practical V-Ring Type Packing provides long-lasting, positive seal. Each split ring is easily installed .... fluid pressure seals V-Rings against rod . . . on each suction stroke, lip pressure against rod is negligible, reducing rod wear.

**Ideal "Blue-Stripe" Piston Rods "GT" or API Types:** Recommended for high pressure work, "GT" Rod has shoulder feature to prevent movement of piston on rod . . . prevents creeping and bursting of piston cores. Standard API Rods meet requirements for wide interchangeability range. Both types also available in "Blue-Chrome" for corrosion resistance.

**Ideal "GT" Pistons:** The long flexible rubber lips of the "GT" fluid piston assure positive sealing under pressure and permit proper lubrication at the same time.



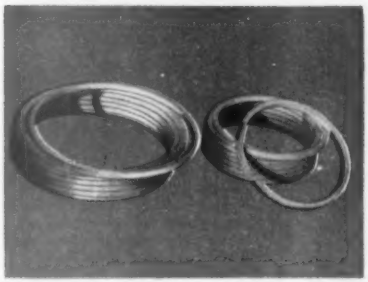


*maintenance with* IDEAL®

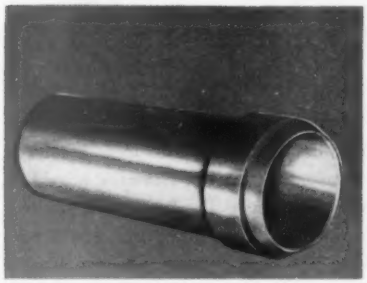
# FLUID END PARTS

## KEEPS SLUSH PUMPS IN TOP WORKING CONDITION

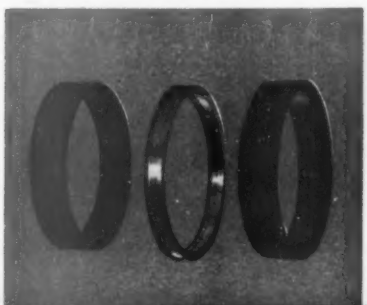
**Ideal Cap and Head Gaskets:** Made of long lasting material, are easily installed and seal better under pressure.



**Ideal Fluid Cylinder Liners:** Precision ground inside and out, "Nationaloy" Liners are finished to close tolerances and are highly resistant to wear. They fit closely in the pump . . . prevent fluid leakage and pump damage . . . reduce wear on pistons and rods due to misalignment. Also available with "Blue-Chrome" to prevent pitting, washing, and wear caused by corrosion.



**Ideal Cylinder Liner Packing:** Dependable packing units molded of oil, gas, heat and chemical resistant compound . . . provide a perfect seal between liner and pump bore. Each sleeve is hard enough to prevent excessive flowing and pinching . . . resilient enough for good sealing . . . carefully made for close fit.

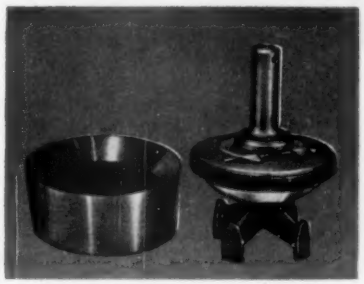


Effective preventive maintenance is sure to pay off in maximum slush pump efficiency. And you'll find it worthwhile to specify "Ideal" Fluid End Parts as one means of reducing the cost of slush pump maintenance.

Of like importance are these three facts about "Ideal" Fluid End Parts—

- **They're carried in stock at every one of more than 100 National Supply Stores in the United States and Canada.**
- **They're made available in every major oil field throughout the world by the Export Division of National Supply.**
- **They're designed for use on pumps of other makes, as well as for "Ideal" Slush Pumps.**

That's why you'll always find it worthwhile to specify "Ideal" Fluid End Parts to maintain maximum slush pump efficiency at minimum cost through effective preventive maintenance.



**Ideal Type "G-1" Valves and Seats:** Long, trouble-free service is assured by Type "G-1" Valves and Seats designed to give maximum opening with short lift. Absence of cross bars or webs permits full fluid flow resulting in maximum pumping efficiency. Fluid pressure seals resilient rubber disc against seat.

NATIONAL BLUE PRODUCTS

## THE NATIONAL SUPPLY COMPANY

**PITTSBURGH 30, PENNSYLVANIA**

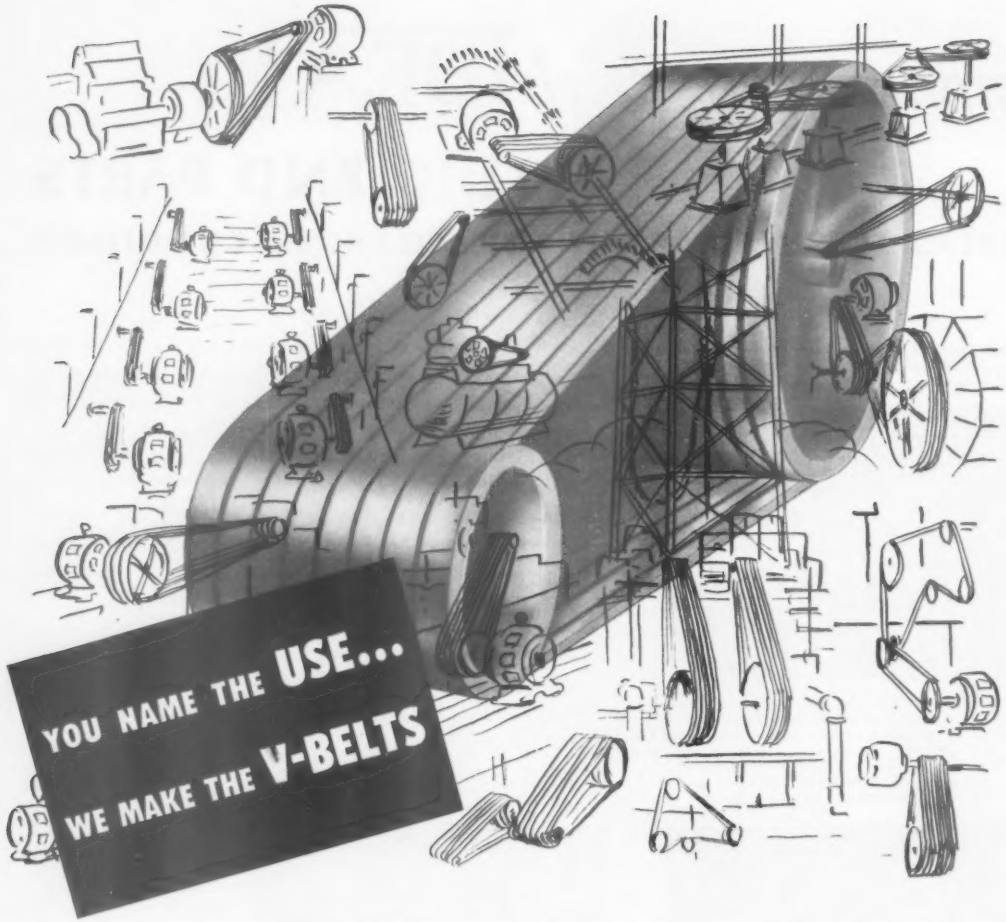
**DIVISION OFFICES:** Casper; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

**CANADA:** The National Supply Company, Limited, 702 Barron Bldg., 610 Eighth Avenue, West, Calgary, Alberta

**EXPORT:** 600 Fifth Avenue, New York 20, N.Y., U.S.A.; River Plate House, 12 South Place, London, E. C. 2

**NATIONAL OIL FIELD MACHINERY AND EQUIPMENT**

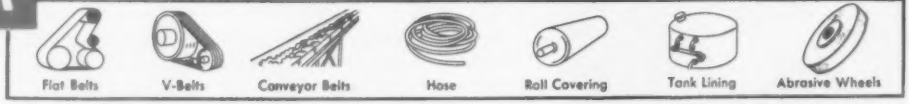
**SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES**




Condor V-Belts can save you money on any type of Multiple Belt drive . . . for any use . . . in any industry. They are the smoothest running V-belts made because every part of the construction is *precision-balanced*. Straight sidewalls provide more grip, less slip, longer life. They are made also in special oil, heat, and static-resisting constructions • V-Belts may not be your problem today but whenever you think of hose, of conveyor, transmission, V-belts, or industrial rubber products for *any* use — remember "Raybestos-Manhattan makes it". Consult your R/M representative.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

**RAYBESTOS-MANHATTAN, INC.**




Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Packings • Brake Linings • Brake Blocks Clutch Facings • Asbestos Textiles • Sintered Metal Parts • Bowling Balls

# How new AMERICAN® Dri-Flo Orifice Meters Simplify Instrument Shop Maintenance

**DRI-FLO Orifice Meters** are advance designed to simplify instrument shop maintenance. Periodic inspection, calibration, cleaning, tear-down and assembly are done with standard tools by competent instrument men. Highly skilled specialists and elaborate equipment are not required.

**The new DRI-FLO Orifice Meters** — built in American Meter Company's century-old tradition for "Sustained Accuracy at Lower Cost" — bring American Westcott precision accuracy, dependability, and low maintenance to applications where mercury manometers are not desired. Available in 50", 100" and 200" ranges, working pressures to 1000 P.S.I., ambient temperatures of –25° to 175°F.

## CHECK THESE OUTSTANDING TIME SAVING, LABOR SAVING ADVANTAGES...

**EASE OF INSTALLATION**
Pedestal, panel or overhead hanger mounting; top or bottom gage line connections. No precise levelling, no seal pots required.

**ONE PIECE STAINLESS STEEL BELLOWS**
Minimizes metal fatigue for long service life. Easily filled with fluid in the instrument shop without elaborate equipment.

**NO STUFFING BOX LUBRICATION**
American Type "B" Teflon Seal Stuffing Box is self-lubricating; eliminates shaft freezing and leaks.

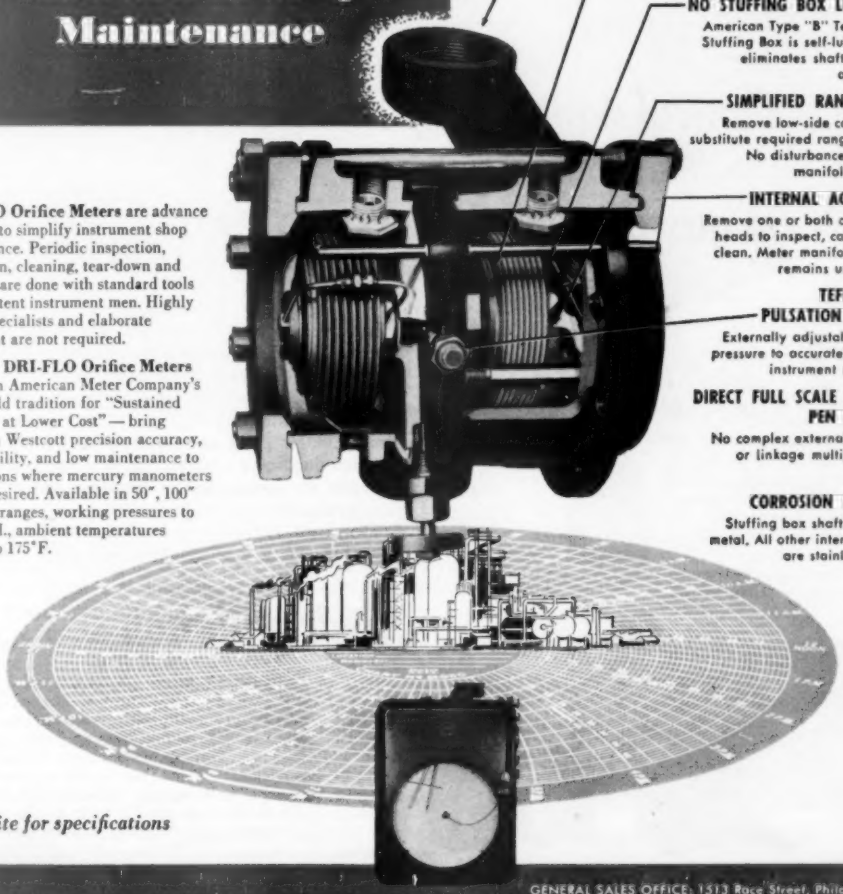
**SIMPLIFIED RANGE CHANGE**
Remove low-side case cover, substitute required range spring. No disturbance of meter manifold piping.

**INTERNAL ACCESSIBILITY**
Remove one or both case cover heads to inspect, calibrate or clean. Meter manifold piping remains untouched.

**TEFLON-SEALED PULSATION DAMPENER**
Externally adjustable under pressure to accurately control instrument response.

**DIRECT FULL SCALE RECORDING PEN MOVEMENT**
No complex external gearing or linkage multiplication.

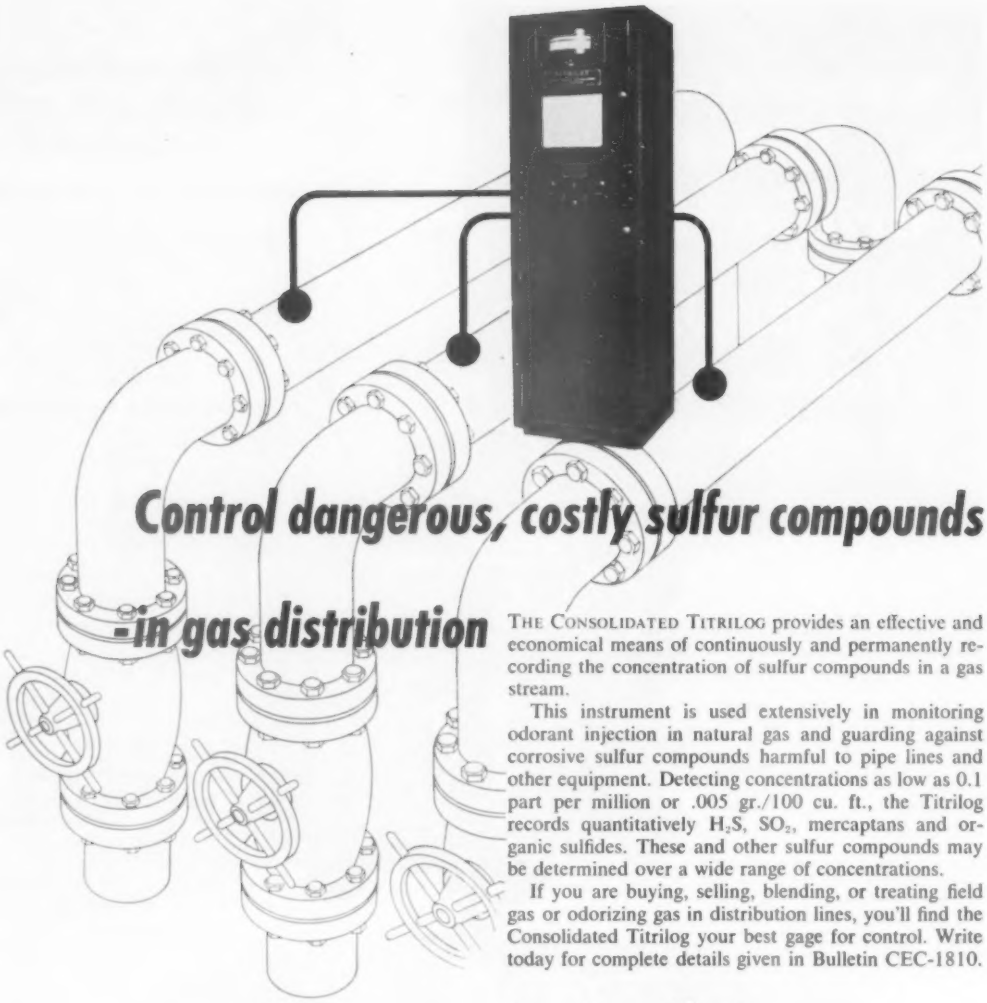
**MAXIMUM CORROSION RESISTANCE**
Stuffing box shaft is Monel metal. All other internal parts are stainless steel.



*Write for specifications*

**AMERICAN METER COMPANY**
INCORPORATED ESTABLISHED 1892

GENERAL SALES OFFICE: 1313 Race Street, Philadelphia
Albany • Alhambra • Atlanta • Baltimore • Birmingham • Boston • Chicago • Dallas • Denver • Erie
Houston • Kansas City • Los Angeles • Minneapolis
New York • Odessa • Omaha • Pittsburgh • Tulsa
San Francisco
IN CANADA: Canadian Meter Company, Limited
Hamilton, Ontario • Edmonton, Alberta



# Control dangerous, costly sulfur compounds

## -in gas distribution

THE CONSOLIDATED TITRILOG provides an effective and economical means of continuously and permanently recording the concentration of sulfur compounds in a gas stream.

This instrument is used extensively in monitoring odorant injection in natural gas and guarding against corrosive sulfur compounds harmful to pipe lines and other equipment. Detecting concentrations as low as 0.1 part per million or .005 gr./100 cu. ft., the Titrilog records quantitatively $H_2S$, $SO_2$, mercaptans and organic sulfides. These and other sulfur compounds may be determined over a wide range of concentrations.

If you are buying, selling, blending, or treating field gas or odorizing gas in distribution lines, you'll find the Consolidated Titrilog your best gage for control. Write today for complete details given in Bulletin CEC-1810.

## -in air pollution

Either model of the Titrilog may be used effectively for the control or study of air pollution. The concentration of dangerous $H_2S$ is shown on a continuous or instantaneous basis—permanent recording and audible warning protect plant personnel and community. Portable model may be moved to locate source of contaminants. Will not react to carbon dioxide, carbon monoxide, ammonia, or hydrogen. Unsaturated hydrocarbons produce a negligible error because of their low reaction efficiency. Investigate this safeguard against plant or community air pollution.

**Consolidated Engineering**
CORPORATION
*300 No. Sierra Madre Villa, Pasadena 8, California*

CEC

*Analytical Instruments for Science and Industry*

## Titrilog

Two models—26-102 stationary unit, 18½″ x 22½″ x 66″ and 26-103 portable, approximately 50 lbs. Both are offered only on a rental basis which includes installation, service, maintenance and operating supplies.

# Emsco's two new light rigs

*... for Shallow Drilling*

*... for Workover*

*... for Servicing*

The new Emsco GB-160 twins represent another forward step in design, ease of operation and low-cost performance in the light rig class.

A two-speed, heavy-duty herringbone gear transmission is used in both rigs to increase their efficiency and ease of operation. All controls are located at the driller's position. A neutral brake is standard equipment. Drums are free spooling. Brakes are water-cooled.

A built-in hydraulic torque converter provides an infinite range of speeds ... permits maximum obtainable horsepower to be utilized ... assures smoother operation ... and eliminates damaging shock loads.

For information about these rugged, smooth-operating GB-160 twins, call CONTINENTAL.

CONTINENTAL

"SERVING THE OIL AND GAS INDUSTRIES"

THE CONTINENTAL SUPPLY COMPANY, General Offices: DALLAS, TEXAS

Export Div.: The Continental Supply Co., Inc., 30 Rockefeller Plaza, New York, N.Y.
The Continental Supply Company, Limited, 216 Lancaster Bldg., Calgary, Alberta

Representatives: Argentina, Bolivia, Brazil, Chile, Colombia, England, Ecuador, Peru, Trinidad, Uruguay, Venezuela

EMSCO

E121-F-52

## Optional Rotary Drive Package

The GB-160 Rigs are so designed that the optional rotary drive package—consisting of shaft extension, friction clutch, bearings and rotary drive sprocket—may be flange-bolted to the drumshaft. This unique arrangement represents a saving to the operator who does not require a rotary drive.

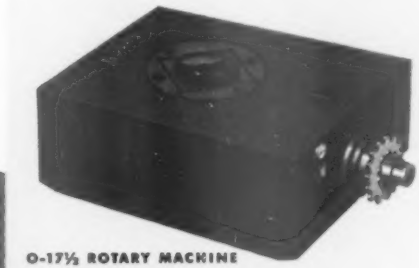
## Inboard Torque Converter

A chain drive between the built-in hydraulic torque converter and engine (or engines) gives the operator complete freedom in his selection of engines. Any make of engine, either high or low speed, coming within the horsepower limits (130 to 190 h.p.) may be used by applying the proper chain drive ratio between the engine and torque converter.

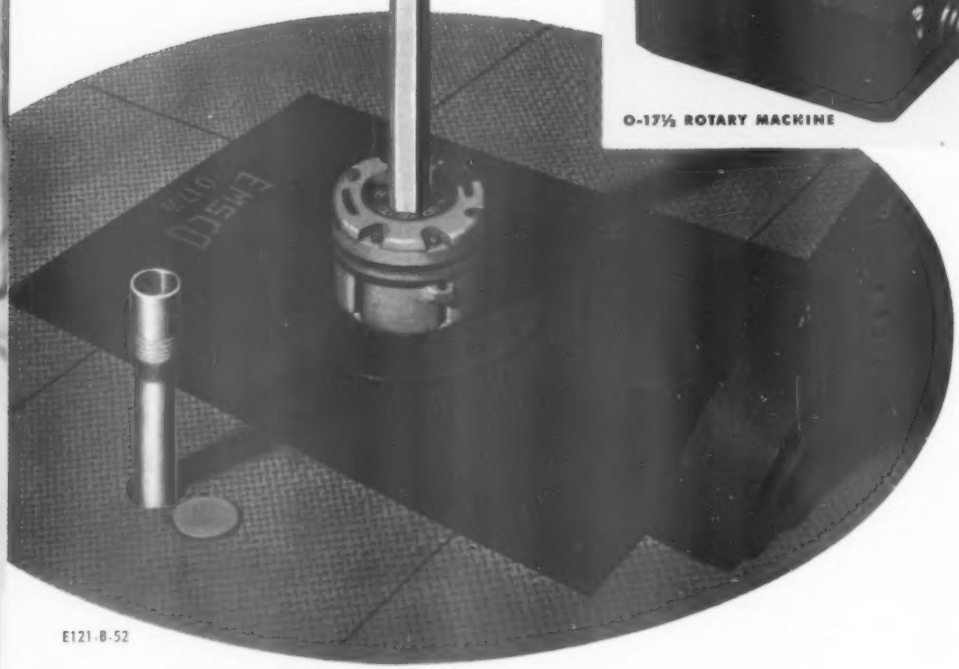
# Seven reasons why operators prefer Emsco's O-17½ rotary

1. **Provides maximum safe working conditions.** Flooring can be set flush with the O-17½ Rotary to eliminate hazardous footing. There are no projections on the table top to trip over.
2. **Assures greater operating convenience.** Table lock, oil gauge and grease fittings are flush-mounted in the table top, and are convenient and easy to reach.
3. **Smoother running.** Flame-hardened, long-wearing spiral bevel gears assure a quiet-running, durable rotary machine.
4. **Prevents mud intrusion.** Every means is provided to guard against mud intrusion, including provision for washdown slots in the table top that eliminate the need for removing the guard ring.
5. **Easier to install.** Because of its rectangular shape there are no intricate floor patterns to cut. Moving and lifting the unit is greatly facilitated by pick up ports in the rotary case.
6. **Eliminates shock damage.** Table locking lever locks the body only. As a result, the tonging shock load *is not* transmitted through the bearings and gears, assuring longer service and lower upkeep.
7. **Available in two API settings, 44" and 53¼".**

Call CONTINENTAL for complete operating details!



O-17½ ROTARY MACHINE



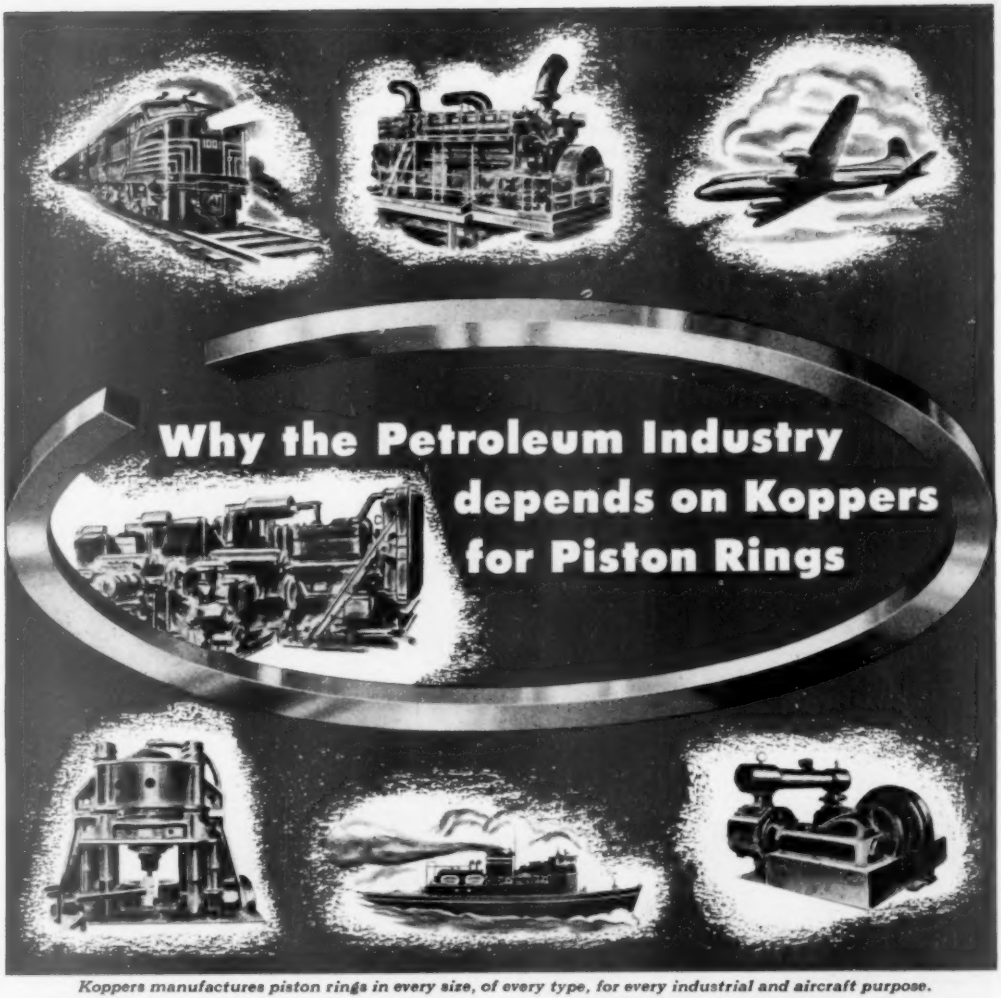

E121-B-52

EMSCO

EMSCO DERRICK & EQUIPMENT COMPANY
Houston, Texas • LOS ANGELES, CALIFORNIA • Garland, Texas

CONTINENTAL

"SERVING THE OIL AND GAS INDUSTRIES"
THE CONTINENTAL SUPPLY COMPANY, General Offices: DALLAS, TEXAS
Export Div., The Continental Supply Co., Inc., 30 Rockefeller Plaza, New York, N. Y.
The Continental Supply Company, Limited, 216 Lancaster Bldg., Calgary, Alberta
Representatives: Argentina, Bolivia, Brazil, Chile, Colombia, England, Ecuador, Peru, Trinidad, Uruguay, Venezuela




*Koppers manufactures piston rings in every size, of every type, for every industrial and aircraft purpose.*

FROM all parts of the petroleum industry come reports of savings in time, labor and money through the use of Koppers Rings in pumps, compressors, diesel and gas engines and other equipment. That's because Koppers research and engineering keep up with modern advances in equipment design by constantly improving ring materials and manufacturing methods.

Koppers K-Iron Rings are made of a high-grade, closely-controlled material that imparts improved wear properties and is surface treated chemically as an anti-scuffing aid. They are made in diameters to 120" in a variety of joint types. Koppers Porous Chrome* Rings hold and distribute oil during break-in, quickly wear to best possible seating... *cut cylinder wear up to 50%, last 4 times as long as ordinary rings!*

Our engineers, who work with you in determining the best rings for your applications, have all the facilities of the large, modern Koppers piston ring plant at their disposal . . . to supply you with rings that cut down-time, increase efficiency and lengthen the life of your equipment.

***WRITE,*** wire or phone us today for experienced help with your piston ring problems. KOPPERS COMPANY, INC., *Piston Ring Dept.*, 1650 Hamburg St., Baltimore 3, Md. **Van der Horst Process*

KOPPERS®

## Koppers American Hammered Industrial Piston Rings

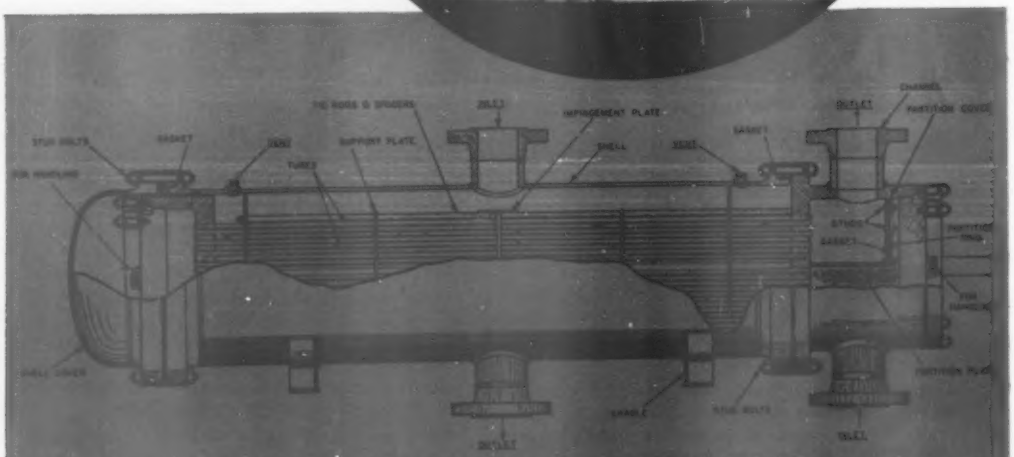
*Only* **KOPPERS** *can furnish K-Spun® and Porous Chrome!*

# Heat Exchangers — with a difference

Long recognised as an aid to efficient industrial production, the modern Heat Exchanger operating through a wide range of temperatures and pressures can help towards increased production and lowered costs in *your* business. Many Industries, such as the Petroleum Refining and Chemical Processing, are obvious users of Heat Exchangers in one form or another ; important others can readily be found amongst the following: — PAPER MAKING · AIR CONDITIONING SHIPBUILDING · FOOD PROCESSING · POWER GENERATION · TEXTILE MANUFACTURE · WATER WORKS.

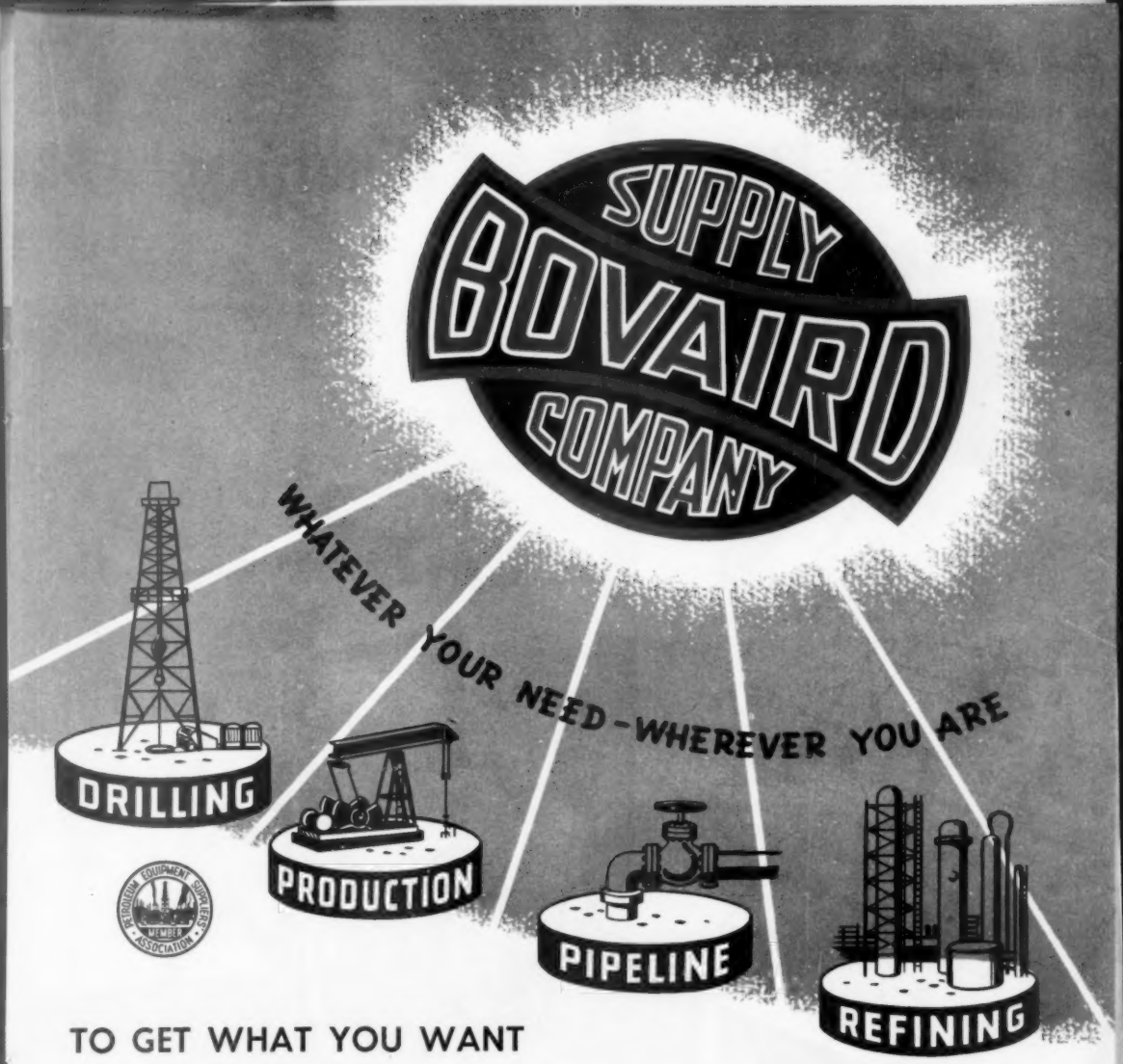
**The matter may be urgent, delay can be costly. Harveys deal with enquiries immediately.**

*The skill of trained operatives combinedwithextensive shop facilities, and backed by Harveys experience in the application of Heat Transfer Equipment to Industry is at your service now.*




The difference Harveys can offer is that, as Licencees of Lummus Company they can produce the Lummus "Multilok" Exchanger. This Heat Exchanger, developed for high pressure operation, is an exclusive design not available in other brands of Heat Transfer Equipment.

G. A. Harvey & Co. (London) Ltd. **Harvey** Woolwich Road, London, S.E.7




TO GET WHAT YOU WANT
WHERE YOU WANT IT
WHEN YOU NEED IT . . .

*"Buy From Bovaird"*

**OFFICES AND STORES**

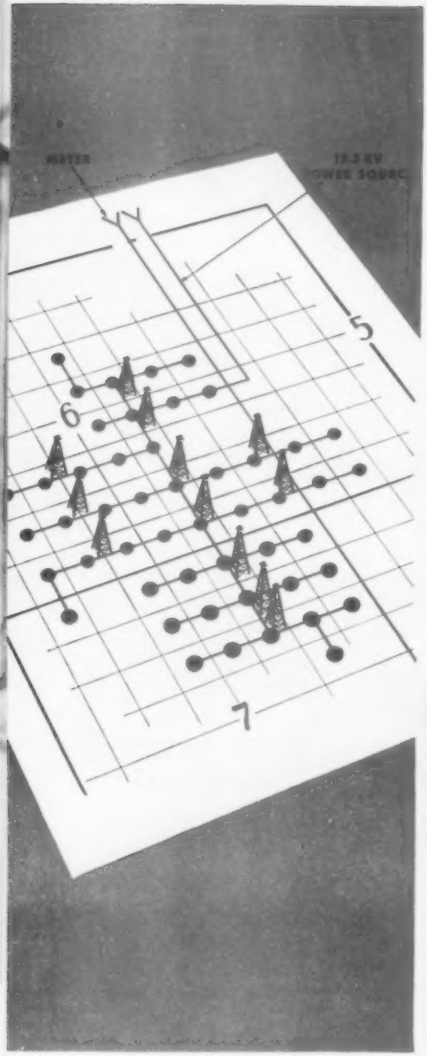
ILLINOIS—Clay City, Grayville, Salem
KANSAS—Chase, Great Bend, McPherson, Pratt, Russell, Wichita
NEW MEXICO—Lovington
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Sapulpa, Seminole, Tulsa
TEXAS—Borger, Dallas, Midland, Odessa, Pampa, Snyder

# THE Bovaird SUPPLY COMPANY

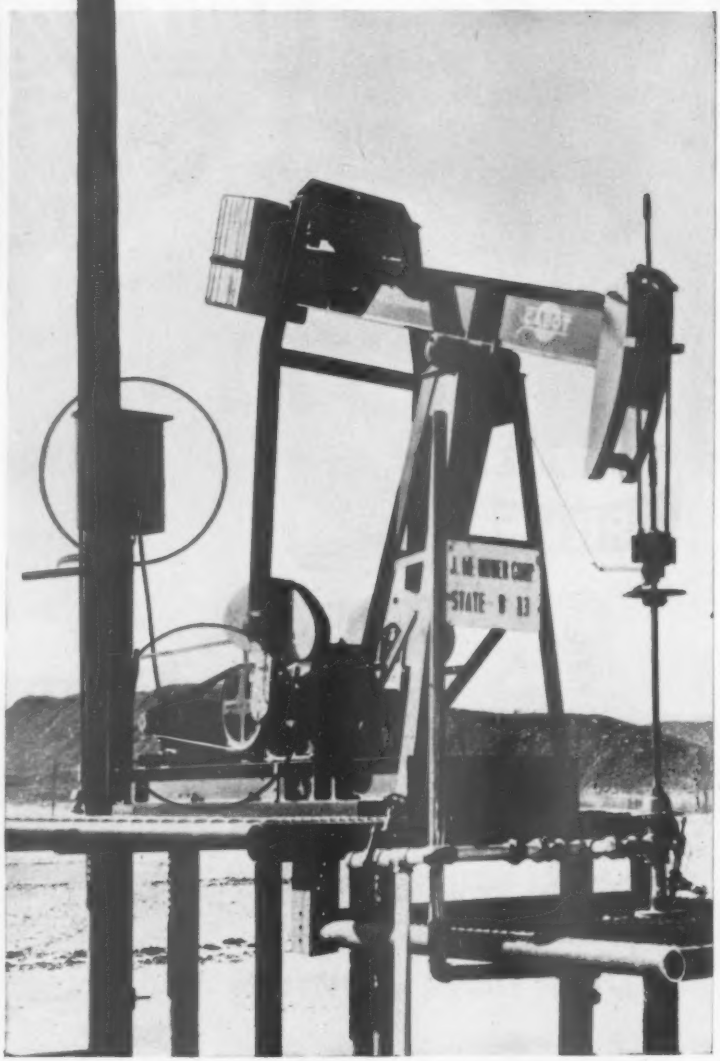
GENERAL OFFICES
TULSA, OKLAHOMA

81 YEARS OF PROGRESS WITH THE OIL INDUSTRY

## *They did what you can do to reduce costs*




Cost of the complete power line for these 49 Oklahoma wells was only $378 per well. Pumping cost is only 4.1c per bbl.



This Westinghouse-equipped pumping rig operates in *blowing sand* in a dry river bed. However, it has given 100% performance!

# An opportunity for major cost savings in petroleum production

Have you really studied the dollar and cents advantages of electrified pumping? Look at these two examples from the Westinghouse files.

### Operates under severe conditions

The photo at left shows a rig mounted on stilts in a dry river bed in Texas. The service conditions are terrible—sand blows constantly except during the rainy season when the river bed floods. Yet the Westinghouse motor and automatic time control have given 100% performance since they were installed two years ago. They haven't even required contact replacement. The automatic control cuts the motor in and out as desired, with just a rare check by the pumper.

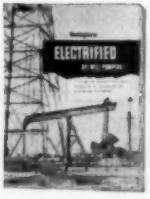
### Pumps 49 wells for only 4.1c per bbl

But you don't have to have unusually severe conditions to make electrified pumping pay. A study of 49 wells in the Healdton field in Oklahoma, shows pumping costs of *only 4.1c per bbl.* Westinghouse automatic time control staggers the pumping load so that power load is just 47% of total connected load. The whole 49 wells are handled by one combination pumper-electrician. And the installed cost of the power line was only $378 per well, including transformers.

### Call Westinghouse for planning help

Determining the best pumping method over the long run requires a careful economic analysis. It's a costly mistake to select equipment simply on the basis of what is easiest or cheapest to set up initially. Westinghouse would like to help you make the type of study that will show whether *you* can make major cost savings in your petroleum production. Call us in.

**DO YOU HAVE YOUR COPY** of this valuable guide on oil well pumping? Write for B-4039, "Electrified Oil Well Pumping," Westinghouse Electric Corp., P.O. Box 868, Pittsburgh 30, Pa.
J-94908




YOU CAN BE SURE...IF IT'S
Westinghouse

EQUIPMENT FOR THE PETROLEUM INDUSTRY

# Now . . . 2 New
## AO COVERGLAS GOGGLES
# Fit Over Safety And Personal Glasses

**NEW**
**Safety Goggles**

#326

#327

**NEW – 4 WAYS!**

1. New Cup Size and Shape
2. New Lens Size and Shape
3. New Side Shields
4. New Easy Lens Replacement

AO's newest development in eye protection—Chippers' and Welders' Coverglas Goggles—can be worn over practically every pair of personal glasses (even the biggest frames) and most types of safety prescription goggles *with and without side shield.*

Wider vision, too, because the lenses are larger and scientifically designed to give up to 20% more vision. Yet, with all these features the goggles weigh but a fraction of an ounce more than ordinary Coverglas goggles . . . cost only slightly more.

These goggles are the newest . . . and two of the greatest . . . developments since the advent of safety goggles. Get all the facts about these two outstanding Coverglas goggles from your AO Safety Products Representative. He can supply you.

***QUICK FACTS***

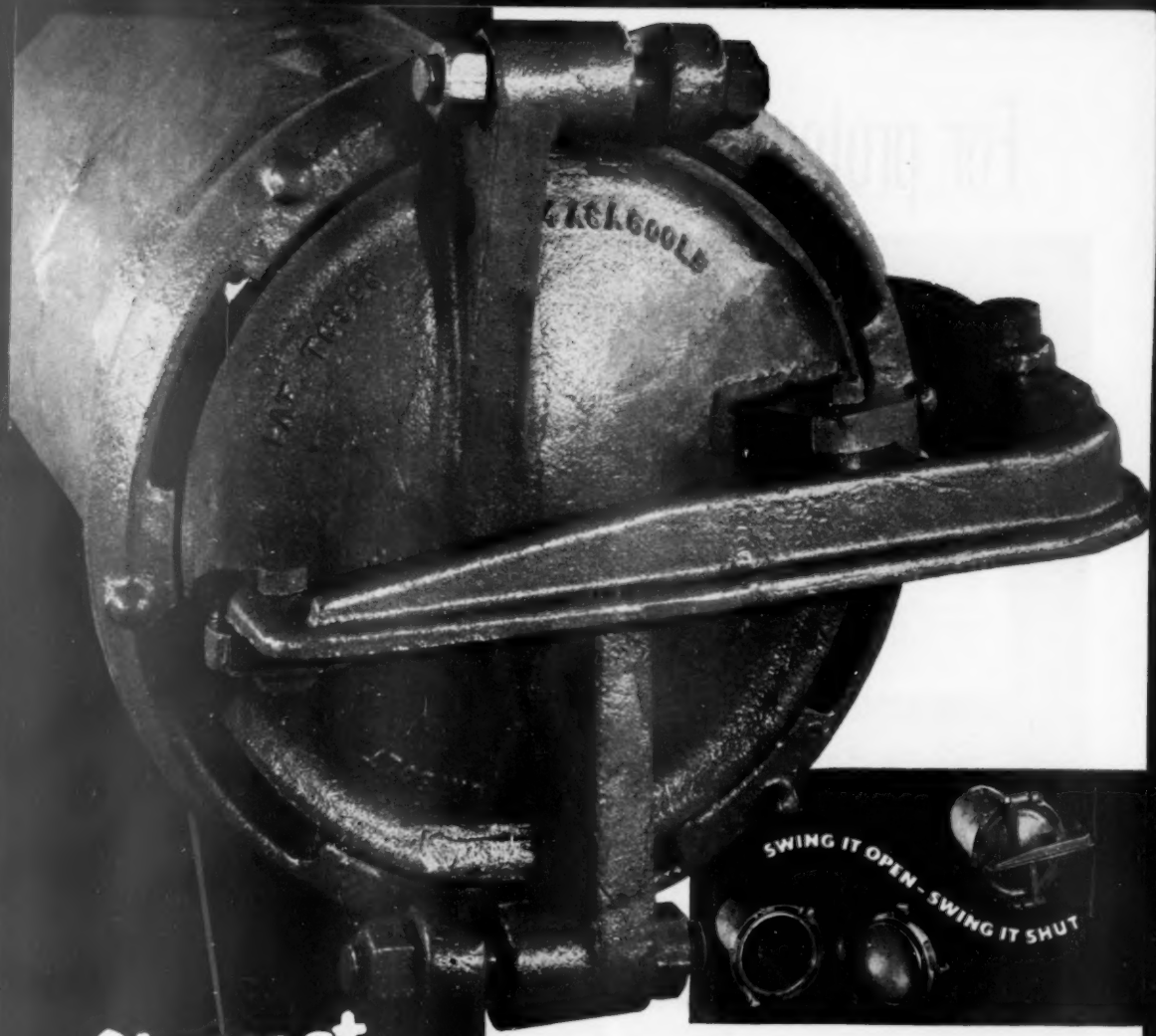
- Lens easily replaceable from rear (not front) by means of a spring clamp—no tools needed
- Lightweight, brown plastic cups fit face snugly, won't conduct heat or electricity
- Light-tight side shields for welders (on No. 327 goggle) provide indirect ventilation
- Bridge—High-grade leather. Instant adjustment
- AO worker-lab tests show much greater field of vision and increased comfort
- All-rubber headband, easily adjustable

"326" Chippers' Coverglas goggle supplied with regular Super Armorplate lenses. "327" Welders' Coverglas goggle supplied with regular Noviweld lenses and cover lenses.

**AO's Industrial Vision Program Increases Production, Decreases Accidents. Write today for booklet "Improved Industrial Vision" to 1011 Vision Park, Southbridge, Mass.**

American Optical
SAFETY PRODUCTS DIVISION

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES




# Biggest "Discovery" in Years

The UNIBOLT Hinged Scraper Trap with self-sealing gasket swings open and shut like a door by simply releasing two bolts. No heavy lifting . . . nothing to fall on workmen . . . no leaks . . . no time-consuming multi-bolt flanged closures. Installed on an oversize barrel, it's no job at all to get a pig in or out of this trap.

These simple, convenient closures are equally desirable for gas line blowdowns, strainers, terminal manifolds, or any other service where pressure vessels must be opened for inspection, cleaning, repairing, connecting to a line, etc.

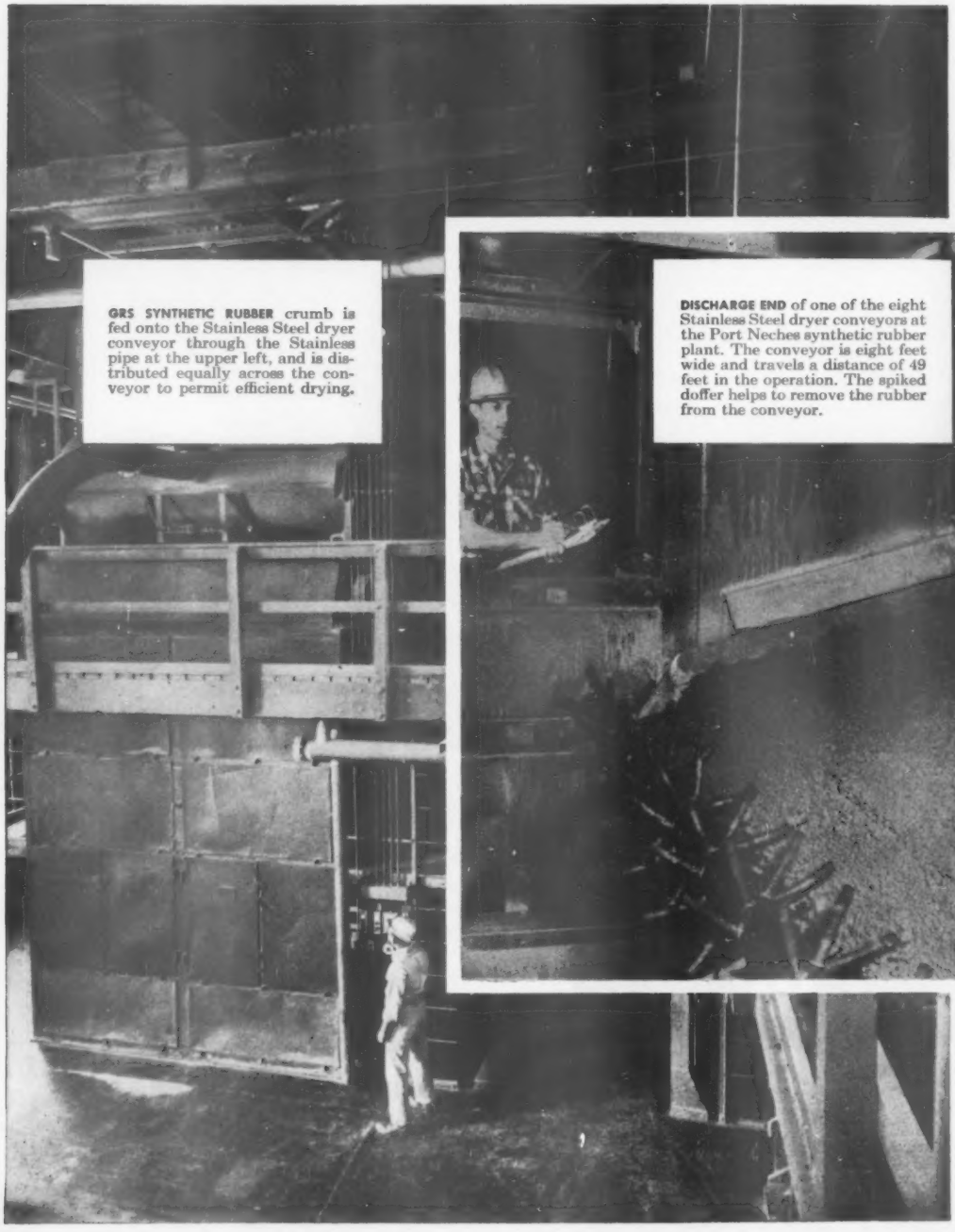
Bulletin PL-*510* will gladly be sent on request.

**THORNHILL - CRAVER COMPANY**

P. O. BOX 1184 HOUSTON, TEXAS

## UNIBOLT SCRAPER TRAP

# For protection against high humidity,



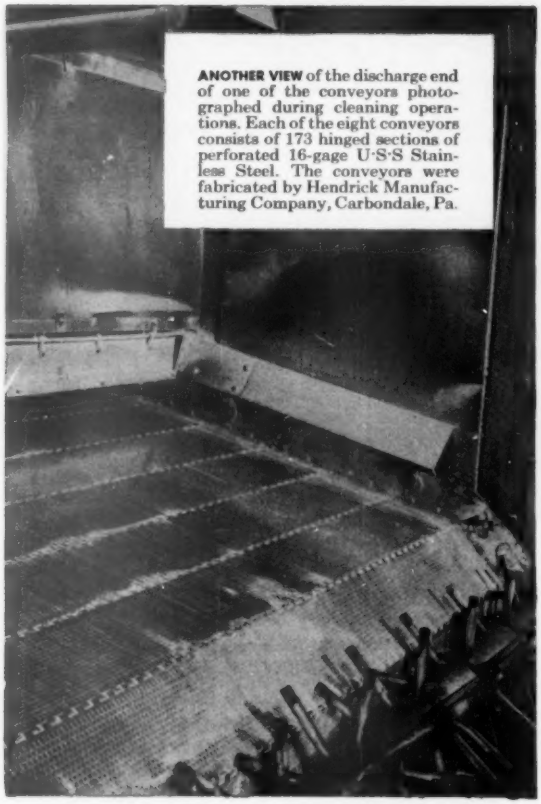
**GRS SYNTHETIC RUBBER** crumb is fed onto the Stainless Steel dryer conveyor through the Stainless pipe at the upper left, and is distributed equally across the conveyor to permit efficient drying.

**DISCHARGE END** of one of the eight Stainless Steel dryer conveyors at the Port Neches synthetic rubber plant. The conveyor is eight feet wide and travels a distance of 49 feet in the operation. The spiked doffer helps to remove the rubber from the conveyor.

# salt and acid

## SYNTHETIC RUBBER CRUMB IS NOW DRIED ON

# Stainless Steel CONVEYORS



**ANOTHER VIEW** of the discharge end of one of the conveyors photographed during cleaning operations. Each of the eight conveyors consists of 173 hinged sections of perforated 16-gage U·S·S Stainless Steel. The conveyors were fabricated by Hendrick Manufacturing Company, Carbondale, Pa.

WHEN the Government's synthetic rubber plant at Port Neches, Tex., was reactivated two years ago, the operator, U. S. Rubber Co., solved the twin problems of corrosion and product contamination in drying operations by replacing existing black iron conveyors with corrosion-resistant U·S·S Stainless Steel.

As wet crude rubber leaves the filter, it contains about 30% water, plus some sulphuric acid and salt not removed by washing. The conveyors carry it into ovens—held at 175°F. This high humidity, salt and acid are highly conducive to corrosion—but not when the conveyors are Stainless Steel.

Stainless Steel has exceptional resistance to the acid and salts in this service. There's no chance of contamination of the finished crude rubber. And the Stainless Steel conveyors can be cleaned more easily and more efficiently.

The service life of the black iron conveyors formerly used was between two and three years. Plant officials expect at least five more years of life from Stainless Steel. The present conveyors have been in operation 126 hours per week over a two year period with no maintenance problems.

The characteristics demonstrated by U·S·S Stainless Steel in this application—excellent corrosion resistance under severe conditions, long life, freedom from product contamination and ease of cleaning—make it the ideal material for many types of petrochemical processing equipment. While the initial cost of Stainless equipment may be higher, its performance makes it far less expensive in the long run.

Our representatives will be glad to discuss the various grades of U·S·S Stainless Steel with you in terms of your applications. When your equipment is fabricated from U·S·S Stainless Steel, you can count on the finest performance.

UNITED STATES STEEL COMPANY, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

**U·S·S STAINLESS STEEL**

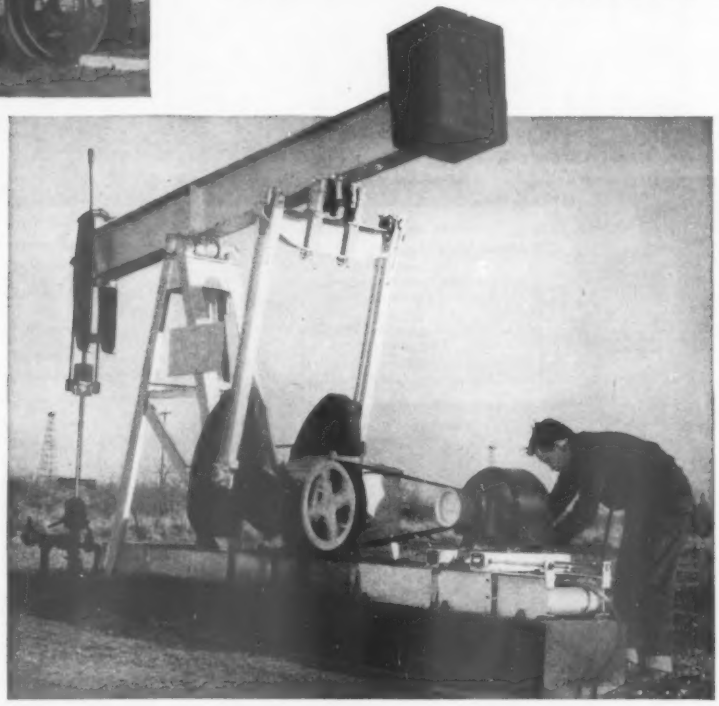
USS

SHEETS · STRIP · PLATES · BARS · BILLETS · PIPE · TUBES · WIRE · SPECIAL SECTIONS

2-1457R

UNITED STATES STEEL

# How much difference can this sheave make . . .



# in this oil pumping job?

The man you see at this site can tell you—and so can hundreds of other oil-production men who have used the Worthington QD*.

Sheaves can be headaches. If they're made with solid hub, bored for tight fit on the shaft, they're tough to get off. If they're built with solid hub and loose bore for quick and easy removal, they often don't hold the shaft tight enough to withstand heavy shock loads without slipping. Not so with Worthington QD. Its unique two-piece design—*especially created to meet the demands of oil-production men*—makes it *easy to get on, easy to get off*. But with its heavy-duty, taper cone friction grip, it hugs that shaft *tight* against even the heaviest shock loads.

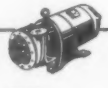
Local Worthington QD distributors in all oil-field areas are stocked-up in most sizes and they're backed up by factory stocks in Los Angeles, Fort Worth, Houston, Tulsa and New Orleans.

It'll pay you to STANDARDIZE on the Worthington QD. For more data, write for Bulletin V1400B7F to Worthington Corporation, Multi-V-Drive Sales Division, Buffalo, N. Y.

*Reg. U.S. Pat. Off.

MV.2.9

COMPRESSORS: AIR-COOLED, WATER-COOLED



PUMPS: CENTRIFUGAL, ROTARY, STEAM, POWER

MULTI-V-DRIVES: QD SHEAVES AND V-BELTS

VARIABLE SPEED DRIVES: WORTHINGTON ALLSPEED DRIVE, WORTHINGTON ALLSPEED MOTOR DRIVE

**Buy these Worthington standard products from your local distributor**

**WORTHINGTON**

Multi-V-Drives

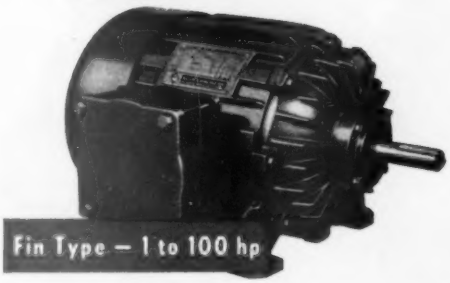
# KEEP MOTOR COSTS DOWN

# *Everywhere* IN YOUR REFINERY

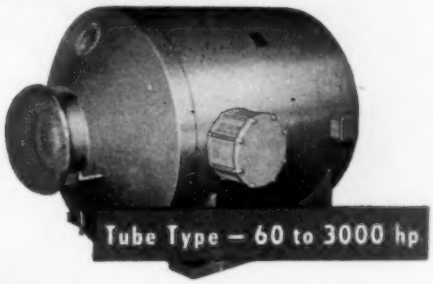
**1 to 3000 hp FOR EVERY REFINERY NEED**

***. . . practically self-cleaning***

***. . . built for outdoor installation***



Fin Type — 1 to 100 hp



Tube Type — 60 to 3000 hp

MAINTENANCE COSTS go way down when you use Allis-Chalmers fin-type explosion-proof motors. The entire heat radiating surface is exposed. There are no enclosed air passages to collect dirt and moisture . . . to clog and cause overheating. If cleaning should be required, it can be done quickly and easily with a cloth, air hose or vacuum cleaner.

Bearings in Allis-Chalmers Type APZZ explosion-proof motors are lubricated at the factory and should need no attention for years. However, if relubrication is desirable, it can be done without removing the motor from service. In addition to close fitting seals at the outer ends of the shaft, the bearings are protected from dust and dirt by a large reservoir of grease on the outer side of the bearing.

THE COOLING SYSTEM on Allis-Chalmers tube-type explosion-proof motors is practically self-cleaning. The system consists of a group of longitudinal tubes surrounding the stator. Warm internal air circulates around them while cool outside air is blown through them. Since the tubes are straight and smooth, the cooling air keeps them clean. If dirt should stick, it can easily be removed with a long-handled brush. Tubes may be made of a variety of materials as required by atmospheric conditions.

Bearings in Allis-Chalmers tube-type motors may be either grease lubricated, ball type, or sleeve bearings, depending on the size and speed of the motor. Both types have highly effective seals against dirt and dust, which makes this motor especially well suited for outdoor installation. A-3865

**YOU CAN GET COMPLETE DETAILS** on all Allis-Chalmers explosion-proof motors from 1 to 3000 hp with Underwriter's Labels up to 800 hp at 3600 rpm from Bulletins 51B7149 and 51B7286. To get your copies, call your nearby Allis-Chalmers Authorized Distributor or District Office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

# ALLIS-CHALMERS

# New cylinder design ups horsepower 27%— TIMKEN® bearings eliminate crankshaft wear

THIS new, heavy-duty Ajax 11″ x 14″ CMD engine that uses gas as fuel and can be converted to oil, has an improved cylinder and piston design which increases its horsepower 27% at 350 RPM. Other improvements claimed by Ajax Iron Works include a direct drive rotary lubricator, rotary magneto, better counterbalancing, and power take-off type of clutch.

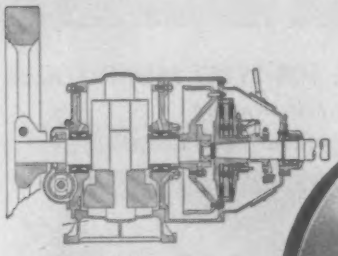
To eliminate crankshaft wear and avoid breakdowns on the job, the engine's crankshaft is mounted on Timken® tapered roller bearings. Due to their tapered construction, Timken bearings carry both radial and thrust loads in any combination.

Crankshaft is held in proper alignment. Crankshaft wear is eliminated because there's no friction between shaft and bearing. There's less wear on related parts as well—less chance of breakdown, less attention needed for maintenance.

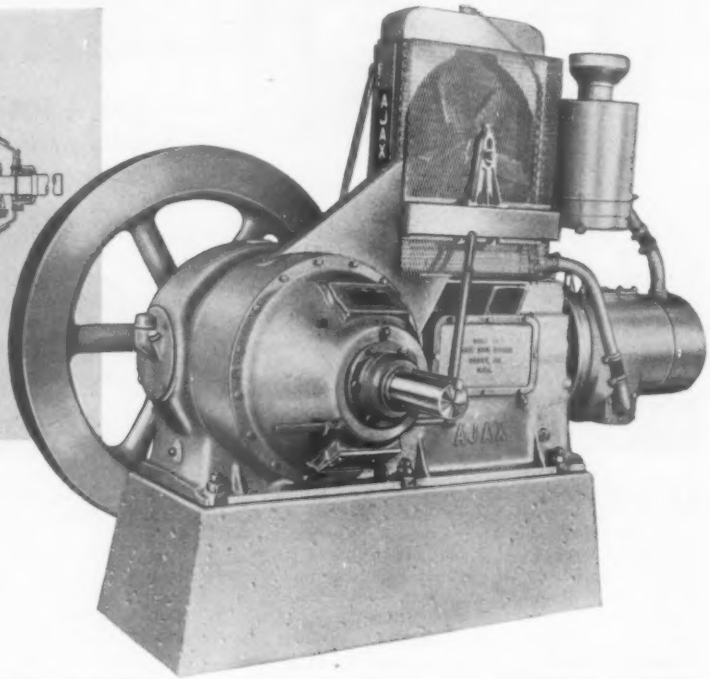
Wear within Timken bearings is held to a minimum because of their true rolling motion and incredibly smooth surface finish. And because they hold housings and shafts concentric, Timken bearings make closures more effective. Dirt and moisture are kept out—lubricant kept in.

For lowest cost operation and maximum performance in the oil field machinery you buy or build, be sure to specify Timken bearings. Look for the trade-mark "Timken" stamped on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

*This symbol on a product means its bearings are the best.*



A typical application showing how **AJAX IRON WORKS** mounts its new 11″ x 14″ CMD gas or oil engine crankshaft on Timken tapered roller bearings.



**WE MAKE OUR OWN STEEL**

The special grade alloy steel which gives Timken bearings their strength and resistance to wear is made in our own steel mills.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

**TIMKEN**

TRADE-MARK REG. U. S. PAT. OFF.

*TAPERED ROLLER BEARINGS*

NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST — LOADS OR ANY COMBINATION

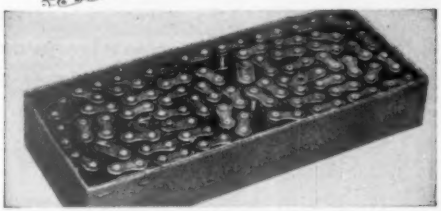
## CHAIN ASSEMBLY . . . CHAIN REPAIR

# THERE'S NOTHING TO IT!

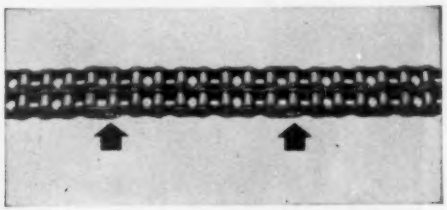
### WITH IMPROVED BALDWIN ASSEMBLY RIVETED ROLLER CHAIN

When it comes to assembly, disassembly or repair of roller chain either at the rig or in the supply store, the improved Baldwin Assembly is your time-saving, money-saving, trouble-saving, temper-saving answer. There's virtually nothing to it. Here's all you do:

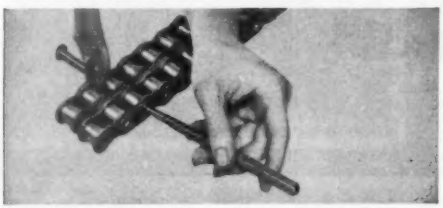
### TO TAKE THE CHAIN APART



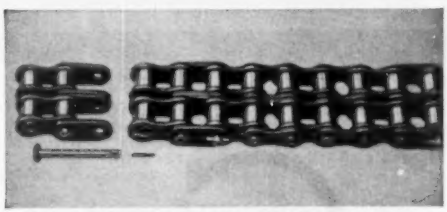
**1** You buy Baldwin Assembly Chains in a packaged unit —a 10-foot strand in every box. Each chain is made up of sections of varying lengths joined by single coupler pins. Stretch the assembled chain out on the bench or the floor.



**2** Locate and mark the coupler or couplers to be disconnected. Their distinctive straight edge side plates, locking pins and washer heads make them easy to locate.

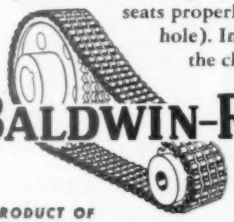


**3** Remove locking pin and drive flatted end of the coupler pin out of its side plate. Then tap it out the rest of the way with a drift pin. Before driving out the pin, back up the opposite side of chain with hammer or vise grip pliers to avoid springing the side plates.



**4** That's how easy it is to take this chain apart. If a section you need is in the middle of the strand . . . just remove the coupler pin on either side of the section desired.

**TO REASSEMBLE THE CHAIN.** To couple this chain, just line up the free end of the coupler link with the adjacent roller link. Back up the link with hammer or vise grip pliers. Drive in the pin (being sure the flatted end seats properly in the flatted side plate hole). Insert the locking pin, and the chain is now reassembled.



**BALDWIN-REX** ROLLER CHAINS

A PRODUCT OF

**Chain Belt COMPANY** OF MILWAUKEE

**It will pay you to investigate the Improved Baldwin Assembly. You'll find it will simplify your chain problems and save you real money. Ask about it at your supply store or use the coupon to send for Bulletin 52-3. Baldwin-Rex Oil Field Sales Offices located in New York • Tulsa • Dallas • Houston • Midland • Los Angeles.**

Chain Belt Company 52-413
4619 W. Greenfield Ave.
Milwaukee 1, Wis.
*Please send me Bulletin 52-3.*

*Name* .....

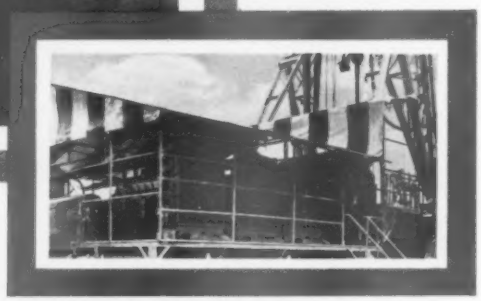
*Company* .....

*Address* .....

*City* ..... *State* .....

● *This advertisement is one of a series featuring popular makes of gas engines in field service.*

ENSIGN Model A Gas Carburetor and Model B Fuel Regulator.



# CLIMAX chooses ENSIGN

This set of CLIMAX V-12 Engines is one of the biggest power-packs ever hooked to a drilling rig. Economical with power to spare, these gas engines carbureted by ENSIGN respond instantly to changes in load requirements.

Like gas engine operation, ENSIGN Carburetion is simple, dependable, and practically fool-proof. Furthermore, in oil fields the world over, operating men "know the engine" better when it is equipped with ENSIGN carburetion.

You can't beat ENSIGN'S experience when it comes to building gas carburetion equipment. For more than 40 years we have concentrated solely on the mechanics of gas carburetion. ENSIGN field engineers will be glad to be of service to you.

**ENSIGN CARBURETOR COMPANY**

7010 SOUTH ALAMEDA STREET, HUNTINGTON PARK, CALIFORNIA

HUNTINGTON PARK, CALIF.

CHICAGO 36, ILLINOIS

LOS ANGELES 23, CALIFORNIA

***DEALERS AND DISTRIBUTORS IN ALL PRINCIPAL CITIES***

**FIELD MEN PERFORM** the first step in the "Hydrafrac" process. Napalm (also used in "jellied gasoline") mixed with kerosene forms a heavy "gel," to which sand is added. When forced down a well under enormous pressure, it splits rock formations. A "gel breaker" is then introduced to help return the "gel" to a fluid state. Oil previously held captive now has a channel of escape through the new cracks and widened fissures held open by the sand. It can now flow or be pumped to the surface.

# THEY SPLIT THE EARTH FAR UNDERGROUND TO FREE CAPTIVE OIL FOR YOU

## *New process brings extra billion barrels to nation's supply*

EVERY DAY oil men now recover more petroleum for your needs than ever before. Combining hydraulic pressure and a heavy jellied kerosene, they apply a "liquid wedge" thousands of feet below surface to split layers of rock around the well bore—thus releasing oil previously held captive by tight rock formations.

This revolutionary new process, called "Hydrafrac,"* already has added a billion barrels to the nation's available crude oil reserves.

This benefits every American. Every barrel added to our petroleum reserves strengthens our country in peace and in war, helping to keep oil plentiful and at reasonable prices.

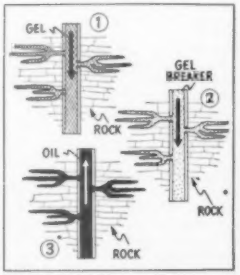
There are great possibilities in "Hydrafrac," developed by the Stanolind Oil and Gas Company, a subsidiary of Standard Oil. Of more than 12,000 wells treated and tested, 3 out of 4 have responded with notable—in many cases, spectacular—increases. Whole fields, previously considered not worth developing, are now producing oil.

"Hydrafrac" can be used by any oil producer—as a licensed service. For many years Standard Oil has offered, through license, its new process improvements. Hundreds of its patented developments are being used by the industry, all at reasonable royalty rates.

The "Hydrafrac" story vividly shows the importance of research. It also shows how cooperation and sharing of research benefits can make more petroleum and petroleum products available to you.

**Standard Oil Company** (INDIANA)

**Registered service mark of Stanolind Oil and Gas Company (Subsidiary of Standard Oil Company) licensed to the Halliburton Oil Well Cementing Company.*




**THE 3 STEPS IN "HYDRAFRAC":**
1. Heavy "gel" is pumped under pressure up to 10,000 lbs. per square inch. Rock that imprisons crude oil cracks under force of hydraulic pressure.
2. A "gel breaker" is introduced to help return "gel" to fluid state.
3. Oil formerly held back in rock now flows through cracks into well bore.

**RESEARCH GOES ON** to solve underground secrets. J. W. McClanahan, Jr., a "Hydrafrac" service engineer, checks the critical step in treating a well. As the gauges register a build-up of pressure to 2,800 pounds per square inch, then drop off, the engineer knows that underground fracturing has begun. Well opens up and flows at 294 barrels a day!

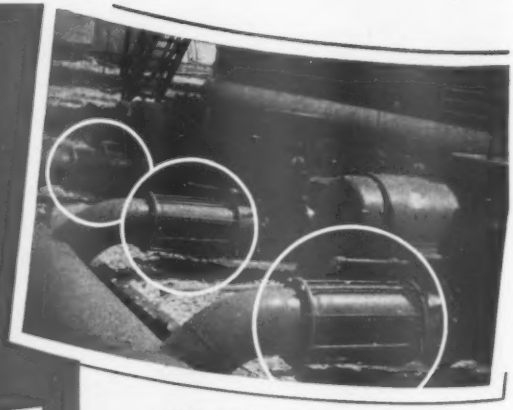
**RESEARCH GOES ON** improving the "Hydrafrac" process. In a laboratory, G. C. Howard shows the principle of the process by fracturing a rock specimen with an improved Napalm "gel." Pressure has hit 1,600 pounds per square inch on the "gel." Only through continuous experimentation can new and improved processes be developed.

**RESEARCH GOES ON** to help John Fenton of Joliet, Illinois, "fill 'er up" for Albert Kinson, just as thousands of other Standard Oil dealers do for millions of customers. Research has helped make gasoline one of today's biggest bargains. It has raised the quality so that two gallons today do the work that took three in 1925.

# mighty handy..

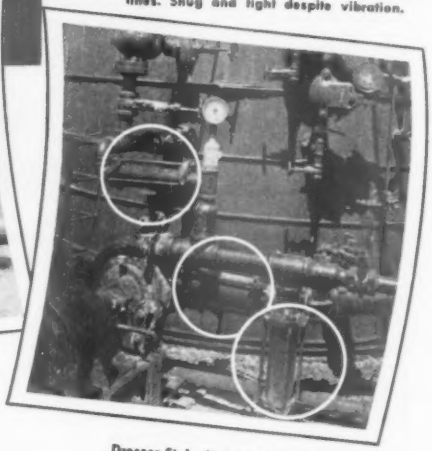
to have around an oil field

# DRESSERS



10" Dresser Long Sleeves on cooling tower lines. Snug and tight despite vibration.

8" and 6" Dresser Sleeves on mud lines to drill rig. "Flexible-Tightness" absorbs line "give and take".



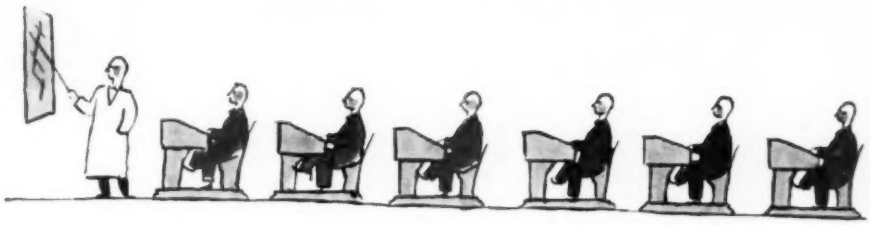
Dresser Style 40 Long Sleeves on salt water tank. Easy to connect. Always dependable.

## *from your favorite supply dealer*

Alamo Iron Works
American Supply Co.
Banks-Miller Supply Co.
Bethlehem Supply Co.
F. W. Black
Bovaird & Co.
Bovaird & Seyfang Mfg. Co.
The Bovaird Supply Co.
Bradford Supply Co.
Briggs-Weaver Machinery
Brown-Strauss Corp.
The Cameron & Barkley Co.
Capital City Supply Co.
Cen-Tex Supply Co.
Clowe & Cowan, Inc.
Coastal Supply Co., Inc.
The Continental Supply Co.
Cooper Supply Co.
C. W. Cotton Supply Co.
Crane Co.
Dunigan Tool & Supply Co., Inc.
Federal Oil Field Supply Co.
Franklin Supply Co.
Frick & Lindsay Co.
General Oil Field Supply
Grinnell Co., Inc.
Houston Oil Field Material Co., Inc.
Howard Supply Co.
Industrial Supply Co.
Iverson Supply Co.
Jarecki International Supply Div.
Jones & Laughlin Supply Co.
Keystone Pipe & Supply Co.
Lloyd-Smith Co., Inc.
Louden Tool Co.
Louisiana Supply Co.
The McJunkin Supply Corp.
Mid-Continent Supply Co.
Midland Supply Co., Inc.
Momsen Dunnegan Ryan Co.
Morrison Supply Co.
Mountain Iron & Supply Co.
Murray-Brooks, Inc.
The National Supply Co.
Norvell-Wilder Supply Co.
Oil Well Supply Div.
Peden Iron & Steel Co.
Peerless Supply Co., Inc.
Pelican Well Tool & Supply Co.
The Producers Supply & Tool Co.
Republic Supply Co.
The Republic Supply Co. of Calif.
San Antonio Machine & Supply Co.
Spain Supply Co.
Standard Supply & Hardware Co., Inc.
Superior Iron Works & Supply Co., Inc.
United Supply & Mfg. Co.
Weaks Supply Co., Ltd.
Well Machinery & Supply Co., Inc.
Western Supply Co.
Wilson Supply Co.
Jack Yates Pipe & Supply.

# DRESSER COUPLINGS and Repair Products

Dresser Manufacturing Division, 59 Fisher Ave., Bradford, Pa. Warehouses: 1121 Rothwell St., Houston, Texas; 101 S. Bayshore Highway, South San Francisco, California. Sales Offices: New York, Philadelphia, Chicago, Houston, South San Francisco. In Canada: 629 Adelaide St., W., Toronto.



ENGINEERS
HANDPICKED
FROM THE BEST
ENGINEERING-
SCHOOLS AND
TRAINED BY
EXPERTS !

WHY OPERA-
TORS PREFER
SCHLUMBERGER!

SCHLUMBERGER WELL SURVEYING CORP. • HOUSTON, TEXAS

**SPECIAL STAINLESS STEEL INNER WIRE BRAID IS SECURELY LOCKED TO INSIDE WALL OF TUBE.** You get this added safety protection and assurance of longer hose life only with CONCORD #20 STEAM HOSE... another of BWH's significant developments in the field of mechanical rubber products!

## Resists Tube Swelling

## Withstands Tough Usage

# Concord #20
## STEAM HOSE

Here's the steam hose with built-in long life... in the form of a special stainless steel inner wire braid.

This inner lining is there to fight tube swelling under continuous high pressure... a condition that kills ordinary steam hose — and usually kills it *fast.*

Found only in CONCORD #20 STEAM HOSE, this protection helps assure retention of original inside hose diameter... acts against swelling and constriction of tube... promotes full flow of steam and easy recoupling in the field when necessary.

CONCORD #20 includes other construction features: two or three braids (depending on size) of alternate high tensile steel wire and rubber layers firmly bonded over outside of tube for maximum burst protection and safety; an asbestos braid for positive cover adhesion and cover insulation; a rugged, abrasion-resistant cover that withstands the toughest abuse.

Put CONCORD #20 to work for you now... get in touch with your nearby BWH distributor today.

BWH
DEPENDABLE RUGGEDNESS

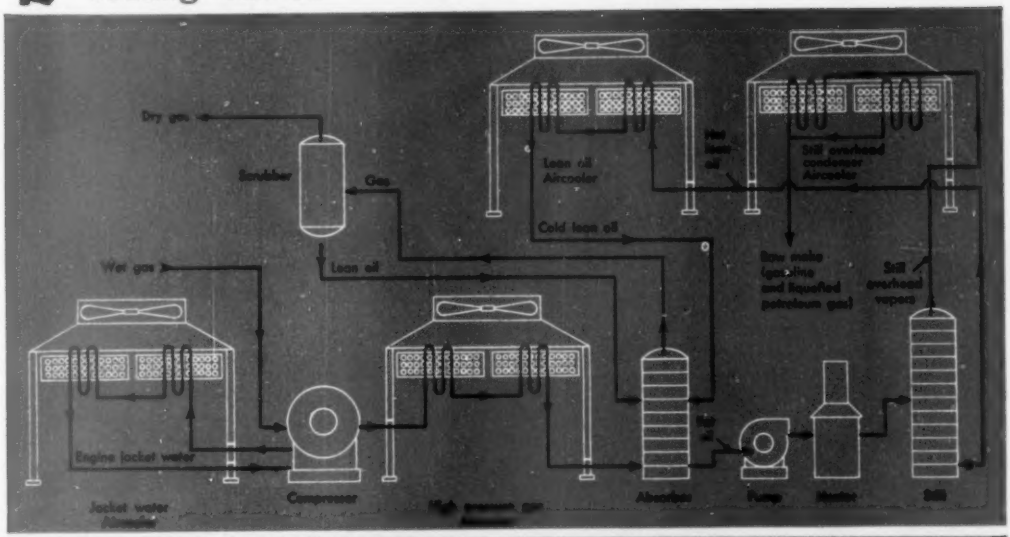
*Another Quality Product of*

**BOSTON WOVEN HOSE & RUBBER COMPANY**

Warehouse Stock: 111 N. Canal St., Chicago, Illinois **Distributors in all Principal Cities**

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

- cooling engine jacket water
- cooling high pressure gas
- condensing overhead vapors
- cooling lean oil




# versatile ALCO AIRCOOLERS handle all these cooling duties at natural gasoline plants

ALCO Aircoolers demonstrate their versatility in natural gasoline plants. The simplified flow diagram above shows how Aircoolers are used to cool jacket water, cool high pressure gas, condense overhead vapors and cool lean oil.

The flexibility of ALCO fabricated steel header design also permits handling a number of different fluid streams in one tube bundle. For example, in some installations a single Aircooler may perform both the lean oil cooling and overhead vapor cooling functions.

ALCO Aircoolers are the logical and economical solution to all types of cooling problems where abundant good water is not available. Scale and corrosion troubles are eliminated.

For details call your nearest ALCO Sales Engineer at Beaumont, Chicago, Dunkirk, Houston, Los Angeles, New York or Tulsa.

*Send Coupon for ALCO Aircooler Bulletin.*

ALCO

**ALCO PRODUCTS DIVISION**
AMERICAN LOCOMOTIVE COMPANY
*Plants:* Dunkirk, N. Y. • Beaumont, Texas

***In step with tomorrow*— ALCO Aircoolers, Heat Exchangers, Evaporators, Feedwater Heaters, Pressure Vessels, Pipe**

**ALCO PRODUCTS DIVISION**
AMERICAN LOCOMOTIVE COMPANY
Schenectady, N. Y.

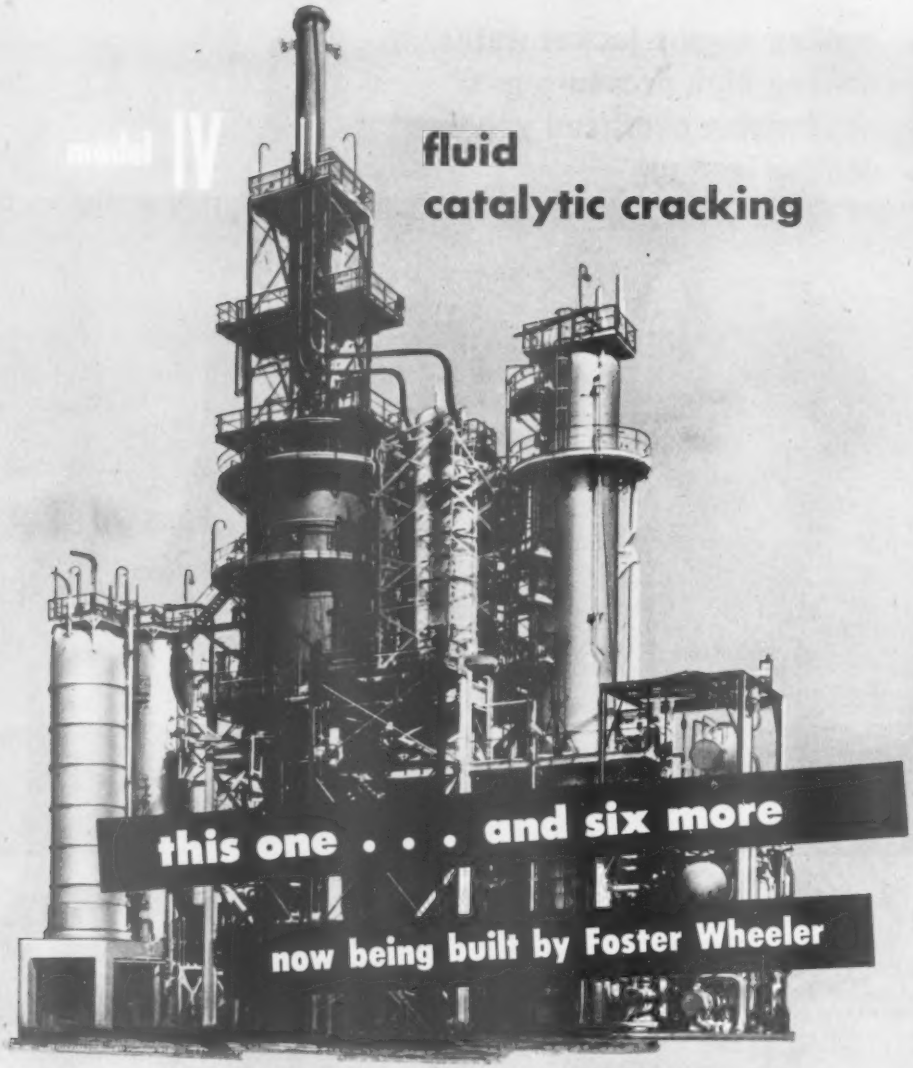
Gentlemen:
Please send me the ALCO Aircooler Bulletin.

Name..... Position.....

Company.....

Address.....

City..... Zone..... State.....




Lower in first cost . . . compact in structure . . . flexible in operation . . . the Model IV Fluid Catalytic Cracking unit represents the latest application of the fluid catalytic cracking principle for the production of high-octane components for both motor and aviation gasolines.

Seven Model IV units in seven different countries are now being designed and constructed by Foster Wheeler.

**FOSTER WHEELER CORPORATION**

165 BROADWAY, NEW YORK 6, NEW YORK

# READ why these towers and lines are insulated with FOAMGLAS

New gasoline plant at Sholem Alechem, Oklahoma, operated by Magnolia Petroleum Company.

AT this new gasoline plant, FOAMGLAS is used to insulate fractionating towers, heat exchangers, valves, fittings and piping and finished with an aluminum covering.

Even without a protective coating, this remarkable insulation will not transmit vapor. That's why it is the ideal material for these exposed locations where moisture is a problem.

FOAMGLAS comes in solid blocks that can be cut with a saw or simply scored and broken. As a result, it lays up fast with a minimum of labor.

Beveled and curved special shapes are available for all types of process equipment, as well as plain or factory-wrapped pipe insulation. And you can get factory-fabricated sections for all types of valves and fittings.

Send the coupon for a free sample of FOAMGLAS and our latest booklet.

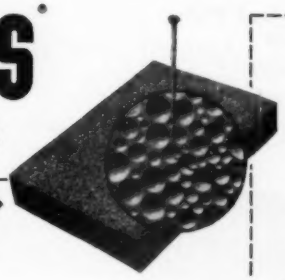
**PITTSBURGH CORNING CORPORATION • PITTSBURGH 22, PA.**

PITTSBURGH PC CORNING

**FOAMGLAS®**

*the cellular glass insulation*

The *best* glass insulation is cellular glass. The *only* cellular glass insulation is FOAMGLAS. This unique material is composed of still air, sealed in minute glass cells. It is light weight, incombustible, verminproof. It has unusually high resistance to moisture, chemicals and many other elements that cause insulation to deteriorate.



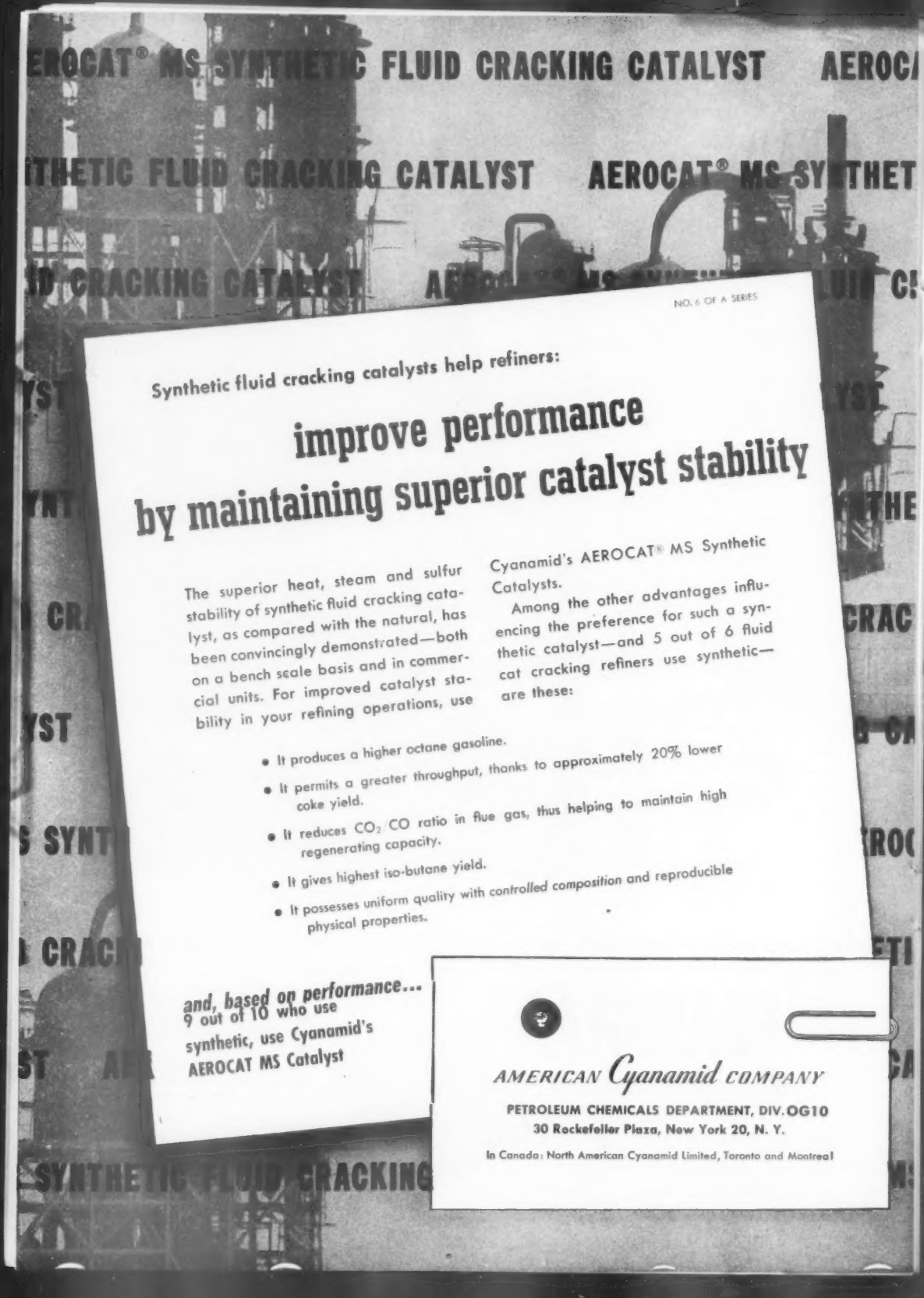
Pittsburgh Corning Corporation
Dept. DD-102, 307 Fourth Avenue
Pittsburgh 22, Pa.

Please send me, without obligation, a sample of FOAMGLAS and your FREE booklet on the use of FOAMGLAS for Piping and Process Equipment.

Name.....

Address.....

City.....State.....




NO. 6 OF A SERIES

Synthetic fluid cracking catalysts help refiners:

# improve performance by maintaining superior catalyst stability

The superior heat, steam and sulfur stability of synthetic fluid cracking catalyst, as compared with the natural, has been convincingly demonstrated—both on a bench scale basis and in commercial units. For improved catalyst stability in your refining operations, use Cyanamid's AEROCAT® MS Synthetic Catalysts.

Among the other advantages influencing the preference for such a synthetic catalyst—and 5 out of 6 fluid cat cracking refiners use synthetic—are these:

- It produces a higher octane gasoline.
- It permits a greater throughput, thanks to approximately 20% lower coke yield.
- It reduces $CO_2/CO$ ratio in flue gas, thus helping to maintain high regenerating capacity.
- It gives highest iso-butane yield.
- It possesses uniform quality with controlled composition and reproducible physical properties.

***and, based on performance...***
**9 out of 10 who use synthetic, use Cyanamid's AEROCAT MS Catalyst**

AMERICAN Cyanamid COMPANY

PETROLEUM CHEMICALS DEPARTMENT, DIV. OG10
30 Rockefeller Plaza, New York 20, N. Y.

In Canada: North American Cyanamid Limited, Toronto and Montreal

# They Say—

**What Industrial Freedom Means**

"To industry, freedom means simply an absence of artificial restraints upon its natural, lawful functions. It means the right to make its own decisions on matters properly within its province. It means the right to offer sufficient incentives to its people — shareholders, employes, and customers—to insure satisfactory continuity of usefulness.

"We have ample evidence that an industry deprived of these will decline. After World War II, an economic study was made of German war production. The German industrial machine was good—in fact, very good—but we can only say that it was not good enough to win. And when our investigating teams surveyed the situation they found on every side the cold, stifling hand of bureaucracy and state control. Years of rigid state control had left German industrialists resigned and indifferent, with little incentive to produce.

"These are natural consequences when industry is placed in the strait jacket of state control. Perhaps ours would not follow the German pattern, but we have certainly learned that to the extent freedom is limited or curtailed, to that extent will we forfeit our capacity to progress."

*Crawford H. Greenewalt, president of E.I. du Pont de Nemours & Co., addressing the National Security Industrial Association, New York.*

**Technology Not Enough**

"Every management man knows that it is all too easy to train the engineer and scientist narrowly, to unfit him for taking on management responsibilities because of his lack of broad knowledge and viewpoint. Knowledge of technology is important in modern industry, but the man who is an engineer only is apt to be merely a skilled technician."

*Sidney A. Swensrud, president of Gulf Oil Corp., speaking at the dedication of the graduate school of industrial administration at Carnegie Institute of Technology, Pittsburgh.*

**What About Day Work, Footage Days?**

Sir:

Reference is made to your article, "What Price Drilling Contracts?" in the September 29 issue of The Oil and Gas Journal. We note two of your headings used in this tabulation are as follows: "Day Work Rate" and "Total Footage Days."

Would you please advise us if the rate as set forth under "Day Work


TRUST TROSTEL

Leather Oil Seals

Rigid laboratory control PLUS 100% inspection assures *Consistent Quality*

Leather Packings

Synthetic Rubber Packings

Synthetic Rubber Oil Seals

When the reputation of a product depends on the unfailing performance of a seal . . . you need *quality you can trust.*

Here, at Trostel, quality control procedures are an integral part of the packings specification itself . . . and these carefully worked out procedures are rigidly enforced during processing and manufacture by one or more of *three* separate laboratories. Then, to make doubly sure, each individual packing and oil seal must pass a comprehensive visual inspection before it can be released for shipment.

We invite you to join the growing list of major equipment manufacturers who know from their own experience: *"You can trust a Trostel seal."*

*Illustrated Bulletin On Request*

ALBERT TROSTEL PACKINGS, LTD., Lake Geneva, Wis.

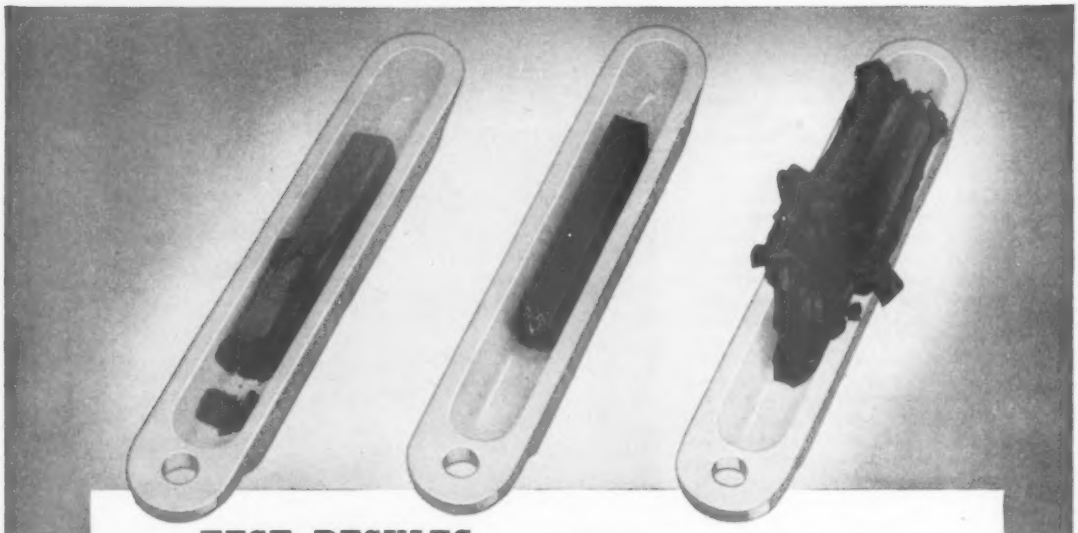
*Formerly Division of Albert Trostel & Sons Co., Milwaukee, Wis.*

BRANCH OFFICES
NEW YORK
LOS ANGELES
SAN FRANCISCO
SEATTLE · HOUSTON
WORCESTER, MASS.

TROSTEL QUALITY

TROSTEL packings

# NOW...New Carboloy
## *for resistance to corrosion,*



### TEST RESULTS

1 **Oxidation resistance.** (Above, left to right.) Samples of 18-8 stainless steel. Grade 608 Chrome Carbide and tungsten carbide after exposure in air at 1850° F. for 24 hours. All were originally identical in shape and size. Grade 608 Chrome Carbide appears to be virtually completely resistant to oxidation at all temperatures up to 1000°C. (1832°F.). Samples subjected to 1850°F. were only slightly discolored.

2 **Salt spray.** After subjection to a 30% salt spray for 750 hours, Grade 608 still retained its metallic lustre.

3 **Sulphuric acid.** With sulphuric acid as the corrosive agent, Grade 608 showed about 30 times the resistance of 18-8 stainless steel, and 3 times the resistance of tungsten.

4 **Nitric acid.** Using nitric acid, the resistance to corrosion was approximately 8 times that of other carbides and twice that of stainless steel.

5 **Steam erosion.** Tests indicate a resistance to steam erosion approximately 60 times that of conventional carbides.

6 **Lactic or citric acid.** Grade 608 was practically inert under all conditions when exposed to lactic or citric acid.

### PROPERTIES OF GRADE 608

The outstanding properties of Grade 608 Cemented Chrome Carbide promise to open new cost-saving applications throughout industry. You may wish to expedite your initial test appraisals by starting with the test kit (above coupon) now pending larger quantities or supplies as production facilities expand.

### PHYSICAL PROPERTIES

*(Grade 608)*

**Composition:** 83% $Cr_3C_2$
2% WC
15% Ni

**Hardness** (Nominal): 88 Rockwell "A"

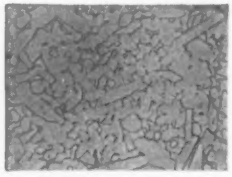
**Density** (Nominal): 7.0 gms/cm³ (Slightly lighter than S.A.E. 1095 steel)

**Transverse Rupture Strength:** 100,000 P.S.I.

**Coefficient of Thermal Expansion:** 6.4 x $10^{-6}$ in range of 70°—1292°F.

**Relative Abrasive Resistance:** Dry Al Oxide—58.0

**GAGE ANVILS** currently being made of Grade 608 Chrome Carbide. In gage blocks, ring gages, plug gages and gage anvils, Chrome Carbide has already shown an outstanding ability to resist corrosion and abrasion. Since its coefficient of thermal expansion is about the same as that of steel, readings are not affected by temperature variations.



**MICROSTRUCTURE** of Carboloy Grade 608 Chrome Carbide shows appearance unlike any other metal. Note, particularly, the uniformity and interlocking character of the grain structure. Chrome Carbide is lighter in weight than tungsten carbide; facilitates handling and use of solid carbide. It will pay to start your laboratory tests on Chrome Carbides now.

# Chrome Carbide
## *abrasion, erosion*

Grade 608 Carboloy Cemented Chrome Carbide, with chromium as principal ingredient, gives high resistance to corrosion or erosion, combined with good abrasion resistance. Lightweight, nonmagnetic, machineable, stable and strong, Grade 608 opens to you new areas for carbide benefits in industrial and product applications. Sample test quantities now available at nominal cost. Production quantities soon.

**NOW, another great Carboloy created-metal makes its bow . . .** Carboloy Grade 608 Cemented Chrome Carbide, first in an entirely new series of metallic carbides.

Grade 608 Chrome Carbide contains chromium as the principal ingredient. It is cobalt-free and practically tungsten-free. It features high resistance to corrosion or erosion, combined with good abrasion resistance.

Field tests already point up exciting new areas where Chrome Carbide will bring new cuts in costs, new highs in performance. Undoubtedly, *your* field, *your* product may benefit, too. Send for test kit to start your preliminary metallurgical and chemical test of Grade 608 today.

### An expansion of carbides

Grade 608 Chrome Carbide is light in weight, completely nonmagnetic and has a coefficient of thermal expansion about the same as that of steel. It is machineable and as hard as tungsten carbide. It is stable and strong.

Fabricating and finishing techniques are the same as tungsten carbides. A flash plating of nickel makes Chrome Carbide blanks (as sintered or as ground) readily brazable with conventional brazing materials.

Series 600 may overlap a few tungsten carbide applications. But because of their unusual wearproofing properties, their wear- and corrosion-resistance, look to Chrome Carbides for famous carbide benefits to you in many new areas of industrial and product applications. Here may be new opportunities for you, starting with Grade 608.

**CARBOLOY**
DEPARTMENT OF GENERAL ELECTRIC COMPANY
Detroit 32, Michigan

"Carboloy" is the trademark for the products of Carboloy Department of General Electric Company

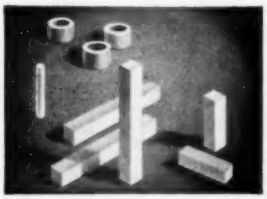
**WHERE CAN YOU USE GRADE 608 CHROME CARBIDE?**

*Field tests indicate new Grade 608 Chrome Carbide offers unusually high resistance to corrosion or erosion combined with good abrasion resistance. For example, the following applications are suggested:*

- Sheer blades for molten glass
- Core pins for baking ceramic parts
- Fishing rod guides
- Centrifuge nozzles, separating equipment
- Bearings where corrosives are present
- Textile guides
- Nozzles and valves: soaps, fats, oils, foods, chemicals, petroleum products, pharmaceuticals, fruit juices
- Valve and core pins, die casting
- Punches for movie film
- For many applications where stainless steel is not sufficiently abrasion-resistant

***Where else can you use Grade 608 Chrome Carbide?***

### 9-piece Test Kit $10.75



**INCLUDES:** Three bars ¼" square x 2"; two bars ¼" square x 1"; three bushings 5/16" long, ½" O.D., 5/16" I.D.; one rod ⅛" diameter x 1" long. (Bulletin WR-104 included.) Samples adequate for wide range of tests. Information relative to your particular application free, on request from Carboloy engineers. Send coupon below today for test kit.

**CARBOLOY Department of General Electric Company**
**11181 East 8 Mile Ave., Detroit 32, Michigan**

**Please send free copy of Technical Bulletin WR-104 only.**

Please send ( ) test kits of Grade 608 Carboloy Cemented Chrome Carbide at $10.75 each. Technical Bulletin included.

Enclosed is ☐ Check ☐ Money Order ☐ Purchase Order for $_____
☐ Please invoice us.

Send to _____ Title _____

Name of Company _____

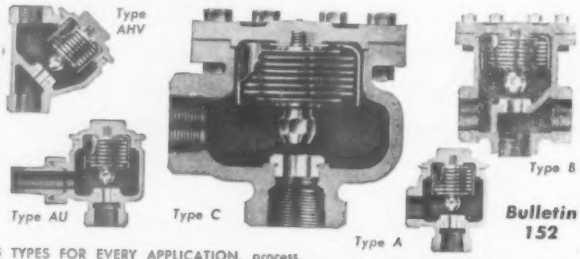
Address _____ City & Zone _____ State _____

In This Plant Nicholson Traps

# SAVE 10% IN STEAM COSTS

Chief Engineer H.F.D. stated, after Nicholsons replaced mechanical traps in his plant: "Saving in steam waste cut our fuel cost at least 10%. Yet application temperatures were up 30°-40°. And relief of all air binding effected faster warm-up."

Operate on lowest temperature differential; 2 to 6 times average drainage capacity; maximum air venting. For other advanced Nicholson features send for Bulletin 152.




Bulletin 152

5 TYPES FOR EVERY APPLICATION, process, heat, power. Sizes ¼" to 2"; pressures to 250 lbs.

210 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS

IN A CLASS BY ITSELF...

COMPLETELY DRILLABLE
You will never have to "mill up" a Baker Retainer Production Packer.

NO "SET-DOWN" WEIGHT REQUIRED
When desired the tubing can be suspended in tension to avoid "corkscrewing."

RESISTS CORROSION
Cast iron construction of the packer is more corrosion resistant than steel casing.

HOLDS BOTH WAYS
Two full sets of opposing slips prevent downward or upward movement of packer.

CLEAR PASSAGE THRU PACKER
for "down-hole" work. Flapper type back-pressure valve opens readily and closes positively.

MANY APPLICATIONS
including two-zone, single-zone, testing, acidizing, re-pressuring, gas lift, etc., are possible with . . .

PACKER IS FREE FROM TUBING
and is practically part of casing. Vertical movement of tubing is unrestricted.

EFFICIENT ACCESSORY EQUIPMENT
as described and illustrated in the BAKER CATALOG and the Composite Catalog.

Product No. 415-D

BAKER

RETAINER PRODUCTION PACKER

Rate" is with or without drill pipe, and does the contractor or operator furnish the fuel?

Under the heading "Total Footage Days" please advise if the number of days as shown includes rigging up and tearing down time or does this time as set forth in your tabulation include only days actually drilled?

Is the information set forth in your tabulation based primarily on one contract or is this information an over-all average of several contracts?

We would like to take this opportunity to commend you for furnishing this type of information to the drilling contractor.

E. J. Smallwood
Wheless Drilling Co.
Shreveport

*Editor's note: Day work rate is quoted without drill pipe. Where two estimates appear for the same field, the lower figure at left is without drill pipe. The number of total footage days as shown includes rigging-up and tearing-down time. It does not include tearing-down time where the contract is split between footage and day work. The tabulation represents data from both companies and contractors. Generally the data represent over-all averages of several contracts, and in some cases variation is shown by a range of footage prices.*

**T. of C. Commendation**

Sir:

Just a note to thank you for moving the table of contents of the Journal to page 1.

It is a real help to many of your readers and indicates, as do many of the other features, a real interest in the guy who reads what you and your men write.

M. C. Forbes, Technical Director
Aquatrol, Incorporated
Houston

**Reprint the Cartoons?**

Sir:

I have been wondering if you anticipate reprinting the cartoons of the Journal in book form.

I refer particularly to the ones by Patterson which have been running for the past few years. I have the feeling that a great many oil men would enjoy having a complete set and might buy them as gifts for their friends.

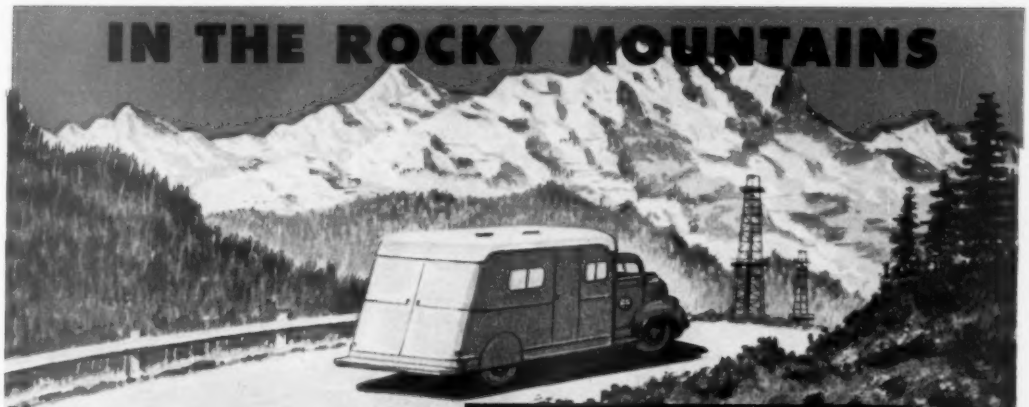
Clark F. Barb, head
Petroleum Production Department
Colorado School of Mines

## CALENDAR

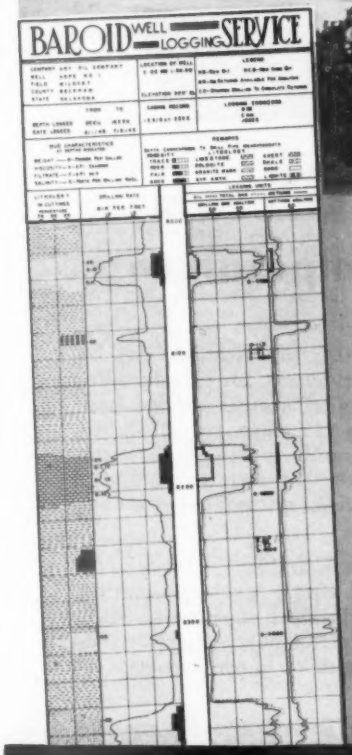
OCT.

22-24 Society of Automotive Engineers, national transportation meeting, Hotel William Penn, Pittsburgh, Pa.

# IN THE ROCKY MOUNTAINS



# BAROID
## WELL LOGGING SERVICE




## *answers all formation questions while the bit is going down*

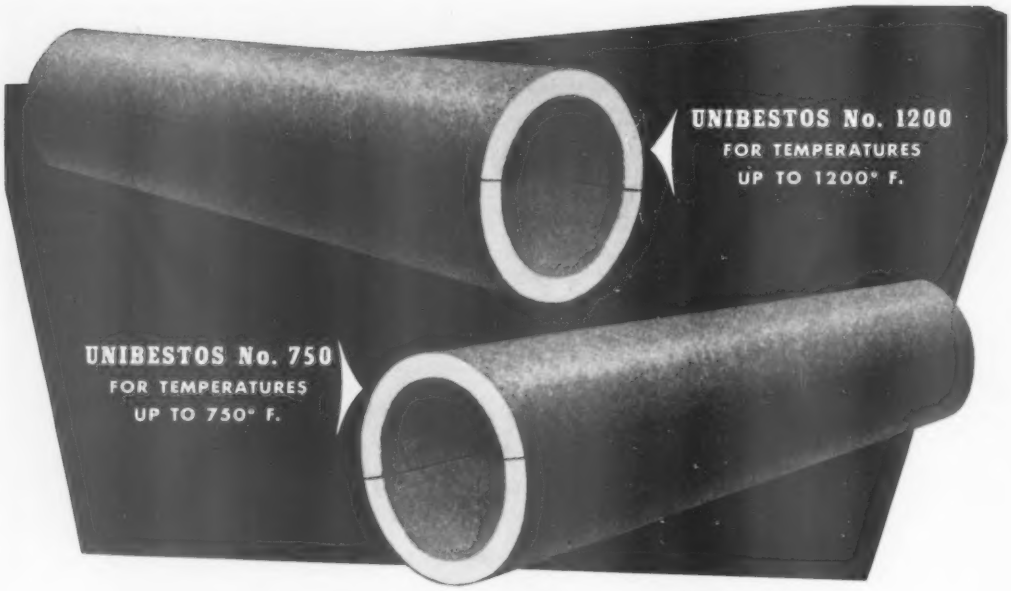
The fresh-water sands so common in Rocky Mountain oil areas make electrical logging difficult and doubtful. In these areas (and in many others) Baroid Well Logging Service is finding increasingly wide use because it provides operators with complete sub-surface information while the well is drilling. No need to "core the drilling breaks"—Baroid Well Logging detects every show of oil or gas, so cores need be taken only when analyses of the mud and cuttings returns indicate possible production. One successful well, for example, went to 10,000 feet, and tested every possible pay zone with just 6 cores! Porous formations are also shown on Baroid Well Logs, together with lithology, the drilling rate, the depths and other pertinent information. Add all the advantages together and you will see for yourself that Baroid Well Logging Service gives you complete well data, with full assurance that no possible production has been missed, plus faster drilling time. And that means, of course, lower costs. We don't have to tell you the importance of that!

### *Call These Numbers*

| | |
|---|---|
| Alexandria, La. | 8630 |
| New Orleans, La. | TUlane 5165 |
| Corpus Christi, Tex. | 3-3262 |
| Midland, Tex. | 2-4381 |
| Houston, Tex. | Linden 6381 |
| Tulsa, Okla. | 2-8161 |
| Los Angeles, Calif. | Michigan 1381 |
| Casper, Wyoming | 2958R |
| Calgary, Alberta, Canada | 2-1316 or 2-1970 |

**Baroid**

BAROID SALES DIVISION, NATIONAL LEAD COMPANY
Main Office: Houston, Texas • P. O. Box 1675, Houston 1, Texas
HOUSTON ★ TULSA ★ LOS ANGELES




# These famous UNIBESTOS twins cut heat loss and surface temperature

**HIGH EFFICIENCY IS UNIMPAIRED BY REUSE OR CONTINUOUS SERVICE**

When you insulate with Unibestos you can be sure of *prolonged* effectiveness, for this durable, high quality insulation resists all service hazards. It's unaffected by moisture, steam, fumes . . . withstands impact and vibration . . . won't shatter, crumble, powder, or dust to contaminate the atmosphere under normal service conditions.

Unibestos is easy to cut and fit . . . brings you the added economy of *single-layer* application . . . may be removed and reused repeatedly without damage or loss of efficiency. Adjacent sections can be stapled together to prevent separation due to expansion.

Phone your Unarco Distributor for *money-saving* Unibestos in cylinders, half-rounds, or blocks.

UNARCO

**UNION ASBESTOS & RUBBER COMPANY**

DEPT. E-10 • 332 SOUTH MICHIGAN AVENUE • CHICAGO 4, ILLINOIS

23-24 American Institute of Mining and Metallurgical Engineers, petroleum branch, West Coast fall meeting, Statler Hotel, Los Angeles.

23-24 Independent Petroleum Association of America, annual membership meeting, Skirvin Hotel, Oklahoma City.

24 Institute of Gas Technology, annual meeting, Chalfonte-Haddon Hall, Atlantic City.

24 Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.

27-28 Society of Exploration Geophysicists, Eastern Canada meeting, King Edward Hotel, Toronto, Ont.

27-31 American Gas Association, annual convention, Atlantic City, N. J.

30-31 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, annual fall meeting of Pacific sections, Statler Hotel, Los Angeles.

30-Nov. 1 Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.

NOV.

3- 4 Society of Automotive Engineers, national diesel engine meeting, Chase Hotel, (tentative), St. Louis, Mo.

5- 7 Industrial Management Society, 16th annual time and motion study and management clinic, Sheraton Hotel, Chicago.

6- 7 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.

6- 8 Gulf Coast Association of Geological Societies, annual fall meeting, Hotel Driscoll, Corpus Christi, Tex.

8-13 Oil Industry Information Committee, Conrad Hilton Hotel, Chicago.

10-13 American Petroleum Institute, thirty-second annual meeting, Conrad Hilton Hotel and Palmer House, Chicago.

13-14 Society of Exploration Geophysicists, midwestern meeting, Texas Hotel, Fort Worth.

17-18 American Institute of Electrical Engineers, subcommittee on electrically operated recording and controlling instruments, technical conference, Benjamin Franklin Hotel, Philadelphia.

20-21 National Association of Corrosion Engineers, western region, second annual corrosion conference, Biltmore Hotel, Los Angeles.

20-22 Instrument Maintenance Short Course, jointly sponsored by Southern California Meter Association and Los Angeles Harbor Junior College.

21 Natural Gasoline Association of America, district meeting, Herring Hotel, Amarillo, Tex.

30-Dec. 5 American Society of Mechanical Engineers, Statler Hotel, New York City.

DEC.

1- 3 New Mexico Oil and Gas Association, annual meeting, Albuquerque.

1-6 American Society of Mechanical Engineers, twentieth National Exposition of Power and Mechanical Engineering, Grand Central Palace, New York.

4- 6 American Chemical Society, southwest regional meeting, Little Rock, Ark.

5- 6 Interstate Oil Compact Commission, winter meeting, Wichita, Kans.


**In this era of *rising* prices . . .**

***KRAFTBILT* announces a**

# price ! reduction

**on *Steel Map and Log Cabinets***
***Map Weights***
***Map Sticks***
***Filing Supplies***

Kraftbilt prices have been in step with everyone's recently—going up. This has caused us great concern and actual dwindling of revenue because, although our business has increased, our profits have decreased. We could foresee the time when prices would reach such a peak that Kraftbilt customers would balk.

The recent steel strike forced the issue. Confronted with another sharp price increase on items involving steel, we resolved to find means to prevent it. Here's our answer:

**By eliminating dealers and selling direct to you, we not only can keep prices at the same level . . . but can actually reduce them by 10 per cent! The explanation is simple: the dealer's profit, or "middle-man" charge, is tacked on between the manufacturer and you. If the dealer is eliminated, the tacked-on charge goes too. You pay only one price—the manufacturer's!**

So remember: for new reduced prices on all-steel Log Cabinets and Rollfiles (for filing rolled maps), Map Weights, Map Sticks, Filing Supplies—**buy direct from us!** Send for our new Price List. Compare it with the old. You'll see the big advantage in buying the direct-to-consumer way!

**ROSS-MARTIN COMPANY**

BOX 800-J • TULSA 1, OKLAHOMA

# Why skilled workmen Choose RIDGID PIPE VISES

8 sizes for pipe from ⅛" to 6"

## It's extra easy to work with RIDGID Bench Yoke Vises

★ All have handy integral pipe rests and benders.

★ Yokes and bases of strong special malleable; top quality tool-steel jaws—LonGrip jaws up to 6" capacity.

★ Made in bench, post, kit, stand and tristand models. Chain vises in bench, post, stand and tristand models.

★ Buy work-saver RIDGID vises at your Supply House.

**THE RIDGE TOOL COMPANY • ELYRIA, OHIO**

RIDGID
Work-Saver Pipe Tools


**7-10** American Institute of Chemical Engineers, annual meeting, Hotel Cleveland (Hqs.) and Carter Hotel, Cleveland.

**1953**

**FEB.**

**2- 4** Missouri Petroleum Association convention, President Hotel, St. Louis.

**27** Natural Gasoline Association of America, regional meeting, Scharbauer Hotel, Midland, Tex.

**MARCH**

**2- 6** American Society for Testing Materials, spring meeting, Statler Hotel, Detroit.

**4- 6** American Petroleum Institute, division of production, Southwestern district spring meeting, Hilton Hotel, Fort Worth.

**8-11** American Institute of Chemical Engineers, Buena Vista Hotel, Biloxi, Miss.

**15-17** American Petroleum Institute, division of production, Eastern district spring meeting, William Penn Hotel, Pittsburgh.

**15-19** American Institute of Mining and Metallurgical Engineers, annual joint meeting of petroleum, metals, and mining branches, Statler Hotel, Los Angeles.

**16-20** National Association of Corrosion Engineers, Hotel Sherman, Chicago.

**18-20** American Petroleum Institute, division of production, Mid-Continent district meeting Mayo Hotel, Tulsa.

**23-25** Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, Tex.

**23-26** American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists, annual meeting, Rice and Shamrock Hotels, Houston.

**30-31** Texas Independent Producers and Royalty Owners Association, annual meeting, San Antonio.

**30-Apr. 1** Mid-West Gas Association, Broadmoor Hotel, Colorado Springs, Colo.

**APRIL**

**8-10** American Petroleum Institute, division of production, Eastern district meeting, William Penn Hotel, Pittsburgh.

**15-17** National Petroleum Association, mid-year meeting, Cleveland.

**21-23** Southwestern Gas Measurement Short Course, University of Oklahoma, Norman.

**26-29** American Institute of Chemical Engineers, Chemical Institute of Canada, joint meeting, Royal York Hotel, Toronto, Ont.

**27-28** Independent Petroleum Association of America, mid-year meeting, Jefferson Hotel, St. Louis.

**Apr. 29-May 1** Natural Gasoline Association of America, annual convention, Rice Hotel, Houston.

**MAY**

**4- 5** American Petroleum Institute, division of marketing, midyear meeting, Baker Hotel, Dallas.

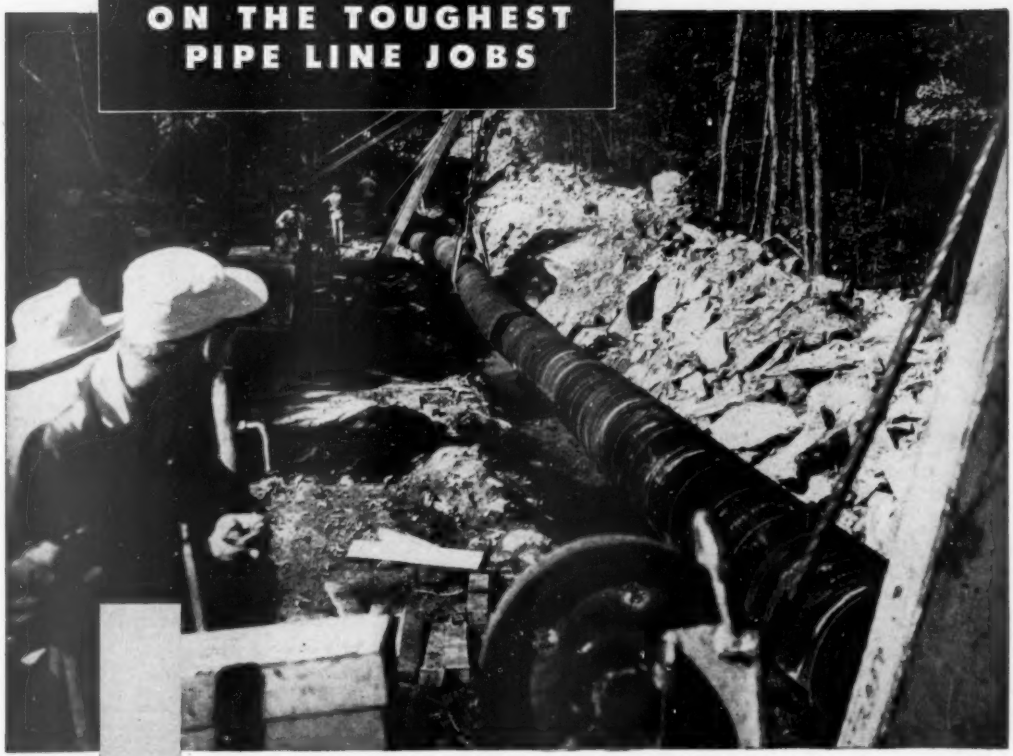
**11-13** Southern Gas Association, Jung Hotel, Hotel, New Orleans.

**14-23** International Petroleum Exposition, Tulsa.

**24-27** American Gas Association, production and chemical conference, Hotel New Yorker, New York City.

**28-29** Natural Gas and Petroleum Association of Canada, London, Ont.

ON THE TOUGHEST PIPE LINE JOBS



## Claymont Welded Steel Pipe Fits Up Faster—Lowers In Easier

Claymont pipe is made from high-tensile steel plates produced entirely in our own plants and quality-controlled through every phase of fabrication starting with the open hearth. Every length is hydraulically expanded for accurate size and perfect roundness...precision bevelled at the ends for time-saving, labor-saving ease of handling in the field.

Available in lengths of 40 feet and in overall diameters from 24 inches through 36 inches. Write to Wickwire Spencer Steel Division, Claymont Plant, Claymont, Delaware or our nearest sales office.

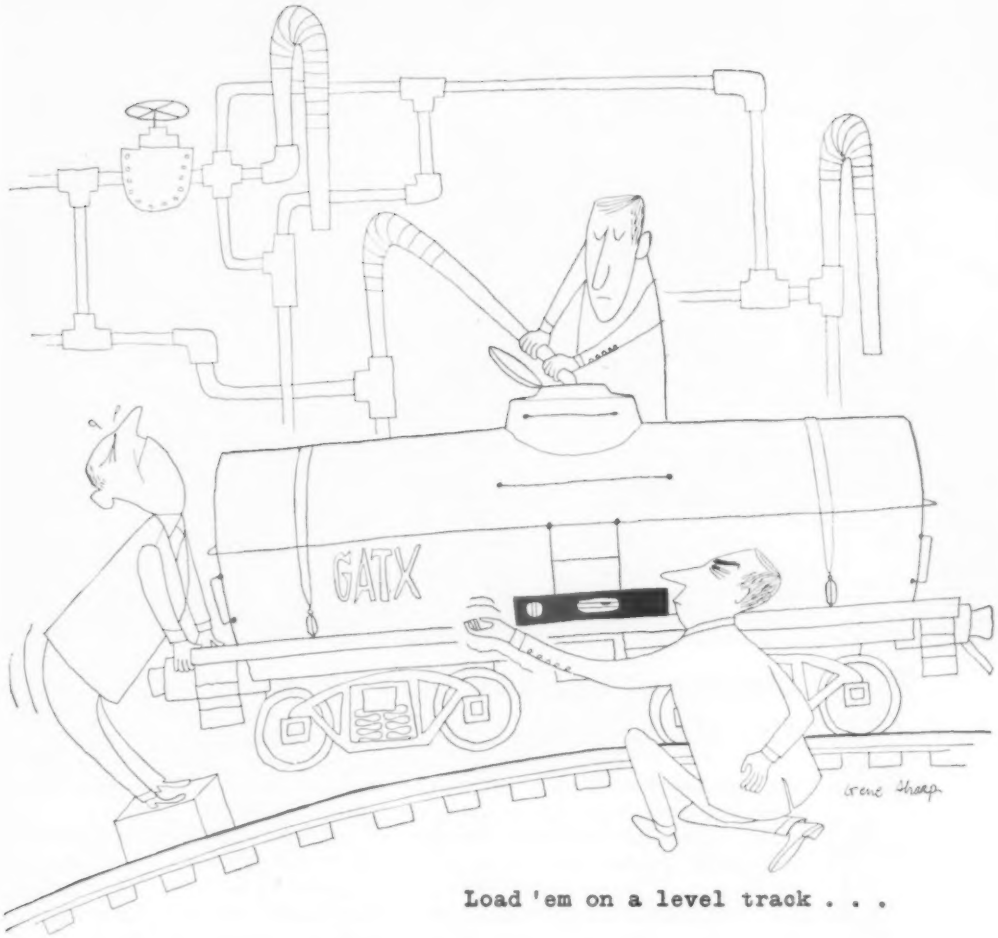
FLANGED AND DISHED HEADS...CARBON, ALLOY AND STAINLESS-CLAD STEEL PLATES
LARGE DIAMETER STEEL PIPE

THE COLORADO FUEL AND IRON CORPORATION – Denver, Colorado
THE CALIFORNIA WIRE CLOTH CORPORATION – Oakland, California
WICKWIRE SPENCER STEEL DIVISION – Atlanta • Boston • Buffalo
Chicago • Detroit • New York • Philadelphia

CF&I

CLAYMONT
WELDED STEEL PIPE
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

## THE CARE AND NURSING OF TANK CARS




Load 'em on a level track . . .

***Another way to get more from your GATX tank cars***

GATX GENERAL AMERICAN TRADE MARK

**GENERAL AMERICAN TRANSPORTATION CORPORATION**
135 South La Salle Street • Chicago 90, Illinois

*District Offices:* Buffalo • Cleveland • Dallas • Houston • Los Angeles • New Orleans
New York • Pittsburgh • St. Louis • San Francisco • Seattle • Tulsa • Washington
*Export Dept.:* 10 East 49th Street, New York 17, New York

THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

●

P. C. Lauinger, President; S. H. Rourke, Executive Vice President; Mitchell Tucker, Vice President and Advertising Manager; Hanson B. Pigman, Circulation Manager; Donald W. Wilson, Manager, Industry Census Department; J. Parker Holland, Production Manager.

**EDITORIAL STAFF**

C. O. Willson, **Editor;** Kenneth B. Barnes, **Managing Editor;** Henry D. Ralph, **News Editor;** George H. Weber, **Refining Editor,** 500 Fifth Avenue, New York; Dahl M. Duff, **International Editor,** 500 Fifth Avenue, New York; Gerald L. Farrar, **Engineering Editor;** Paul Reed, **Pipe-Line Editor;** W. L. Nelson, **Technical Editor.**

**Associate Editors:** Lynn M. Nichols, Neil Williams, R. B. Tuttle, Philip C. Ingalls, and John C. Casper.

**District Editors:** TULSA: Ted A. Armstrong, Joseph A. Kornfeld, John C. Reidel, William P. Sterne, Robert J. Enright, and John C. McCaslin. HOUSTON, Sterling Building: Walter Rose, and F. Lawrence Resen. LOS ANGELES, 650 South Grand Avenue: D. H. Stormont. DALLAS, Mercantile Bank Building: Carl F. Hoot. WASHINGTON, D. C., 621 Albee Building: Bertram F. Linz. MIDLAND, TEX., McClintic Building: Roy F. Carlson. CHATHAM, ONT., 35 Stanley: Victor Lauriston.

**Editorial Assistants:** Carolyn Carter, Tulsa; Martha Allbright, Tulsa, and Wilma Van London, Houston.

**Correspondents** at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., and Mount Pleasant, Mich.

**Advertising Offices:** TULSA: John D. Reilly, Mid-Continent Manager, and Frank D. Potter, Representative, 211 South Cheyenne, Phone 3-6291; NEW YORK: Charles A. Wardley, Eastern Manager, and Robert N. Caird, Jr., Representative, 500 Fifth Avenue, Phone LOngacre 4-1750; CHICAGO: C. R. Farmer, Manager, and E. S. Klappenbach, Representative, 105 West Madison Street, Phone Central 6-2537; PITTSBURGH: Alfred M. Jones, Manager, 429 Fourth Avenue, Phone Atlantic 1-4835; HOUSTON; John M. Spears, Gulf Coast Manager, Sterling Building, Phone Charter 4626; LOS ANGELES: Donald O. Hanson, Manager, 650 South Grand Avenue, Phone Vandike 0722; ENGLAND: Harry Becker, European Representative, 111 Thorley Lane, Timperley, Cheshire, Phone Ringway 4702.

●

Subscription rate to the petroleum industry, United States and foreign, 1 year, $4.00. Single copies, 50 cents. Back copies when over a year old, one dollar. Note: Payments from outside the U.S.A. may be in the form of an international money order or check on a U.S.A. bank. Entered as second-class mail matter at Tulsa, Okla., under Act of March 3, 1879. Copyright 1952 by The Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

# JOURNALLY Speaking

## ABC Stuff

DOWN in the lower left-hand corner of this page you will notice a little black hexagon with the letters ABC. That means a lot to us. It means a lot to you readers, too, because ABC has a direct bearing on how this publication is edited.

That symbol on our masthead means that we belong to the Audit Bureau of Circulations. You've heard of that outfit, in a casual way, because just about every daily newspaper in the country belongs to it. So do most popular magazines and 370 business papers—but not all of them, by any means.

Why the Journal belongs, and how you readers benefit from it makes quite a yarn.

## You Paid for It

YOU can't get the Big Yellow Book unless you pay for it (or unless your company subscribes for you). There is no such thing as a free subscription to The Oil and Gas Journal.

Not all publications are like this. Many, particularly business papers, are given away free. If the publisher can't get people to buy his sheet, he sends it to them anyway and just hopes they'll read enough of it to satisfy his advertisers.

But we collect $4 a year for every name on the mailing list. That $4 doesn't cover the cost of the white paper, so it's not the money—it's the principle of the thing.

What we want is readership, and if you like a magazine well enough to pay for it the chances are pretty good that you'll read it. A magazine that just comes in over the transom is likely to go out the same way.

But our publication goes only to people who pay for it, and so we editors write only for our readers. If we don't print what you want to read, you won't keep on paying and we won't keep on eating.

Because, you see, we can't sell much advertising unless we can prove that we are read by influential operating men throughout the petroleum industry. And the very best proof of readership is the fact that our subscribers value the magazine enough to pay for it.

So that little ABC symbol keeps us on our toes all the time. It is your guarantee that the Journal's editors will bust a gusset to dish out what you readers want every week in the year.

Bet you never thought of ABC that way before.

## Who Reads?

HAVE you ever wondered how a bank president feels when a bank examiner walks in and asks to look at the books?

We know, because the same thing happens at the Journal every year.

That's because we voluntarily pay dues to the ABC to hire auditors to go over our books. These auditors are not looking for defalcation of funds but for something almost as morally wrong — padded circulation statements.

We edit this magazine for operating oil men and for nobody else, and we want everyone to know exactly who gets it, so we publish a detailed statement of the occupations and locations of our subscribers.

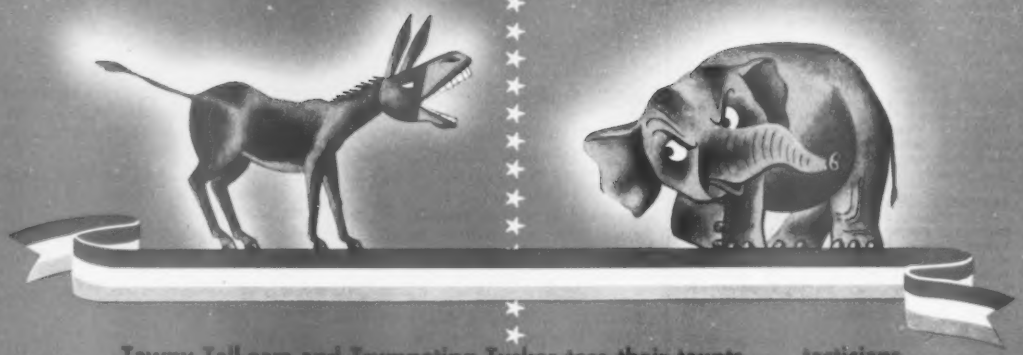
Incidentally, that's why some of your friends can't subscribe to the Journal, and why we ask every new subscriber a lot of questions about his job. But we don't trust ourselves on this, and that's why we follow the ABC rules and have the ABC auditor check our methods and results.

These auditors don't worry us much, any more than a bank examiner worries an honest banker, though our circulation manager does chew his fingernails during the week or so the auditor is looking over his shoulder.

When it's all over it gives us a mighty good feeling to know that our published circulation statement is completely accurate and unchallengable. Our advertisers, our editors, and anyone else interested can tell exactly who reads the Journal.

*—Henry D. Ralph*

# WINNING TICKET



Tawny Tail-ears and Trumpeting Tusker toss their taunts . . . tacticians take to the trails telling tantalizing tales to turn the throngs to their thinking . . . tens of thousands of thoughtful taxpayers tramp to the polls to tally their tickets, thereby terminating the tension. Through this turmoil of tempers and tirades thrusts the truthful talk that WARREN is the TOP TICKET. Trust the tremendous production, transportation, terminal and storage facilities of WARREN to trap a tidy treasure for your till.

GET ON THE BANDWAGON . . . THE TREND IS TO WARREN

VOTE THE WARREN TICKET . . . STRAIGHT.

NATURAL GASOLINE

| | |
|---|---|
| PROPANE | NORMAL PENTANE |
| ISO-BUTANE | HEXANE |
| BUTANE | HEPTANE |
| ISO-PENTANE | HEAVY NAPHTHA |

STA-VOL-ENE

**WARREN**

**PETROLEUM CORPORATION**

TULSA, OKLAHOMA CABLE ADDRESSES: Stavolene, Warren

EXPORT TERMINALS:

CORPUS CHRISTI, PORT ARTHUR, BAYTOWN, TEXAS CITY AND WARRENGAS, HOUSTON, TEXAS

# Oil Progress Week shows real progress

LAST week more people learned more facts about petroleum than during any other seven days in history. This is real progress in the field where the oil industry most needs progress—public understanding of its operations and problems.

Any way you look at it, oil has made progress. Its development of technology during the past generation has been phenomenal. Its achievements in increasing supply, improving quality, and serving consumers are outstanding among American industries. It has cut costs, increased efficiency, and held down prices.

In the social field the oil industry maintains high employment, pays good wages, and leads in workers' benefits. It has increased national wealth, promoted conservation, and contributed heavily in taxes. It has shouldered community responsibilities, raised living standards, and aided government programs in countless ways.

BUT oil has not progressed far in gaining public understanding, appreciation, and sympathy. Too many people think of oil as a rough-and-tumble, get-rich-quick, devil-take-the-hindmost sort of game.

Because a dozen or so oil companies are very big, the entire industry is tagged as "big business" in a way that implies that big business is bad business. The sins of a few big businesses—oil and others—of 40 years ago are charged against the present highly competitive industry.

Oil has suffered because it has not progressed as far in public relations as in its other activities. This has resulted at times in grudging customers, an unfriendly press, and hostile government officials.

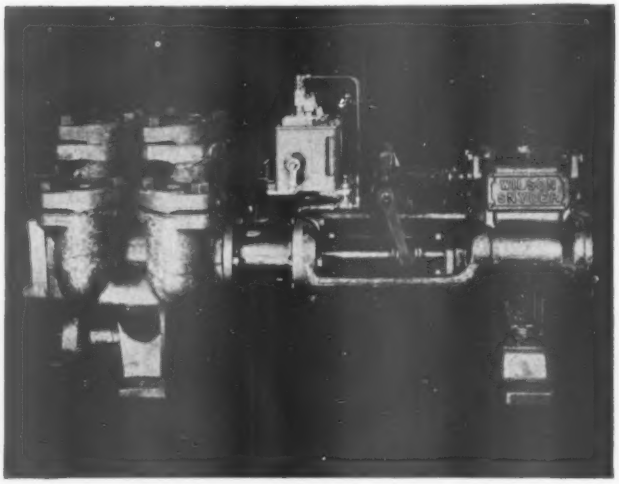
TOO much of the industry's public-relations work was on a high-level, ivory-tower approach. It did not make much progress. Recently, however, good progress has been made through the grassroots, and largely through the device of Oil Progress Week.

Oil Progress Week gets everybody into the act. In their own ways almost all who get their living from oil, at all levels and in all branches of the industry, take part in telling their own communities about their jobs and about what makes their jobs possible. This is the sure way to get public understanding of oil.

This year, more than ever before, oil marketers have taken a prominent part in Oil Progress Week, and this is a most important trend. For every member of the public is a consumer of oil products, and those who market these products are the ones who have most direct, frequent, and intimate contacts with the public. When marketers become the shock troops of public relations, genuine progress will be achieved.

**STAINLESS STEEL MAZE**...a one piece pump body 29" long, 16" wide and 26" high with 14 openings . . . cast in austenitic stainless steel containing 19% chromium and 9% nickel. Weight 500 lbs. Produced by Empire Steel Castings, Inc., of Reading, Pa., for Wilson Snyder Works, Oil Well Supply Division, United States Steel Co.

**STEAM-DRIVEN RECIPROCATING PUMP BODY OF STAINLESS STEEL** . . . for sour crude transmission . . . cast in austenitic chromium-nickel stainless steel having 75,000 psi tensile strength, 40,000 psi yield strength, 45% elongation and hardness of 140 BHN.



# SOUR CRUDE IS NO PROBLEM

## For Pump Bodies Cast in Stainless

These castings are produced in one of the strongest, toughest and most economical materials available for handling sour crude . . . *austenitic chromium-nickel stainless steel.*

*Stainless* offers a unique combination of properties:

**RESISTANCE TO ATTACK** by many corrosive agents . . .

**STRENGTH** . . . at elevated temperatures that surpasses ordinary metals . . .

**TOUGHNESS** . . . high impact values to temperatures as low as −320°F.

Complexity of design is *not* a limiting factor in casting chromium-nickel stainless steels.

Pump body castings, however, are only one of many applications in which stainless steels provide long, dependable performance under corrosive and erosive conditions.

Investigate all the benefits stainless steels can give you. Leading steel companies produce nickel-containing stainless steels in all commercial forms. A list of sources of supply will be furnished on request.

At present, the bulk of nickel produced is being diverted to defense. Through application to the appropriate authorities, nickel is obtainable for the production of austenitic stainless steels for many end uses in defense and defense supporting industries.

INCO

**THE INTERNATIONAL NICKEL COMPANY, INC.** 67 WALL STREET NEW YORK 5, N. Y.

# THIS WEEK

**INTERNATIONAL.**—Iran breaks off diplomatic relations with Britain. . . . Mossadegh, lacking a quorum in the Majlis, issues note "regretting" the action and saying the drastic action will not mean an end to "friendship" between the two countries. . . . Action followed rejection by British of Iran's last offer of a settlement—a demand for a cash payment of $137,200,000. . . . ¶Amerada, Ohio, Continental jointly acquire a half interest in Sinclair's concession in Italian Somaliland. . . . Sinclair is now drilling its second test in adjoining Ethiopia. . . . ¶Shell's Cardon refinery in Venezuela now undergoing emergency repairs. . . . Refinery was shut down by fire September 30. . . .

**PIPE LINES.**—Westcoast Transmission given green light by Canadian authorities to build its big-inch natural-gas line from the Peace River area to Vancouver and across the United States boundary. . . . Only hurdle remaining to construction is approval of FPC of United States portion of line. . . . ¶Salt Lake Pipe Line says it will begin work soon on 140-mile, 8-in. extension of its products line from Pasco, Wash., to Spokane. . . . Initial capacity will be 12,000 bbl. daily. . . . ¶Southern natural lets contracts for construction of 833 miles of gas lines in five southern states. . . . Project to cost $76,000,000. . . .

WARNING TO ALL CITIZENS!
FEDERAL OFFICIALS ARE TRYING TO SEIZE YOUR BEACH
FROM THIS POINT TO THE CITY LIMITS OF SEAL BEACH
UNLESS YOU STOP THEM
THEY CAN PUT OIL WELLS ON YOUR BEACH
YOU WILL LOSE OWNERSHIP AND CONTROL OF YOUR BEACH
YOU WILL BE TRESPASSERS ON FEDERAL PROPERTY
EAST OF THIS POINT
STOP THE FEDERAL

**TAKING THE TIDELANDS CASE SERIOUSLY is Long Beach, Calif., which erected this sign for local residents and bathers. The billboard was erected at the foot of Gaviota Avenue, landward end of the "stipulated line" beyond which ownership is in question. The Long Beach City Council endorsed the erection of the sign by a 6-to-1 vote. Similar signs are being displayed in Texas.**

**ACTIVITY.**—Production of crude and lease condensate averaged 6,512,775 bbl. daily for week ended October 11, up 2,600 bbl. daily. . . . ¶Total well completions gained 78 wells for the week to 923, the highest level since week ended August 23. . . . Wildcat completions were up 36 wells to 255 for an all-time record. . . . ¶Rotary rigs operating in United States increased 30 rigs for week ended October 13 to 2,486. . . .

**TRENDS.**—Indicated demand for gasoline, kerosine, distillate, and residual from domestic refineries was 3.7 per cent greater for the 6-week period ended October 11 than for same period last year. . . . Gasoline gained 3.9 per cent and distillate was up 7 per cent. . . . Increases for kerosine and residual fuel were less than 2 per cent. . . .

**SECONDARY RECOVERY.**—Gulf asks Texas Railroad Commission to approve huge water and gas-injection program in San Andres reservoir overlying south dome of Goldsmith field, Ector County, West Texas. . . . Gulf would be unit operator for itself, Phillips, and Pure. . . . ¶More than 300 engineers study three highly profitable water-flood projects in trip to Greenwood County, Kansas. . . .

**GOVERNMENT.**—Five oil firms involved in grand jury investigation of an alleged international oil cartel ask federal Court of Appeals to reverse lower-court decision refusing discharge of the jury or change of venue. . . . ¶Supreme Court refuses to review lower-court ruling which supports Northeastern Gas Transmission Co. in its contention that it did not receive proper FPC consideration in competition with Algonquin Gas Transmission to serve New England markets. . . . ¶OPS asks PAD review of the California oil-price situation. . . .

**PROCESSING.**—W. R. Grace & Co. reveals that newly formed subsidiary, Grace Chemical Co., will build an $18,000,000 plant near Memphis to synthesize ammonia and other nitrogen products from natural gas. . . . ¶Phillips Petroleum dedicates new T.C.C. air-lift catalytic cracking unit at its Okmulgee, Okla., refinery. . . . Ceremony marks completion of Okmulgee expansion program. . . . ¶Farmers Union Central Exchange completing $4,500,000 expansion of Laurel, Mont., refinery. . . . ¶Saskatchewan Federated Co-Operatives, Ltd., approves $5,500,000 building program at its Regina, Sask., plant. . . .

**NATURAL GAS.**—Texas' outdated 19-year-old regulation restricting production of gas wells to 25 per cent of their potentials may go when Texas Railroad Commission hearing gets under way this week. . . . ¶The Chicago Corp. negotiates revised contract with Tennessee Gas Transmission Corp. for sale of natural gas which will increase its gross annual revenue by about $1,350,000. . . .

# What New Oil Costs

## Study of 32 companies indicates that since the war each new barrel of daily production has cost about $3,200

NEW YORK. — Experience of 32 American oil companies during the last 5 years indicates approximately $3,200 has been required for the development of each barrel daily of new oil production.

This figure was given in a recent report by John S. Herold, Inc., geological consulting firm in New York. Included in the list of companies were most of the larger American operators, some wholly integrated, some producers only, and others with foreign production.

Herold's report showed total exploration and development expenditures of these companies from 1947 through 1951 as $7,757,700,000. The 1946 daily average production of the same group of companies was 4,003,200 bbl.

On the basis of an assumed 7 per cent annual decline in the 1946 output, production in 1951 would have been 2,800,000 bbl. daily had no drilling at all been carried out. However, actual production of the companies in 1951 totaled 5,215,900 bbl. daily.

The difference, 2,415,900 bbl. daily, was considered to represent the average daily production which was created by the companies through the expenditure of $7,757,000,000. Thus, for a single barrel daily, the companies, on the average, spent $3,211.

**Figures not exact . . .** The report emphasized the difficulty of computing such costs with exactitude and pointed out that the data furnished only a general indication of the price paid for oil production.

The approximate nature of the figures was shown by the fact that the listing of capital expenditures for each company, derived from annual reports and other sources, in some cases included the outlay on gasoline plants and related facilities which is not strictly a production expense in this connection. Another factor is that the production figures for net oil output fail to give account to whatever production the companies may have had developed but not producing at the time.

Furthermore, since the expenditures are not both oil and gas development, the per-barrel expense does not provide for natural gas, which is a substantial item in the expenditures of particularly such companies as Pure and Phillips, Herold said. The report also pointed out that current important expansion of production—such as that of Amerada in North Dakota—is not reflected, although a substantial portion of its cost is included in the capital expenditures during the period under study.

When the total exploration and development-of-production capital expenditures of the companies are compared against the change in their production from 1946 to 1951, instead of against the estimated total of new oil found, the expenditure per barrel was found to be $6,400. This less significant figure does not consider the production needed to offset the decline in older fields.

| | Capital expend. for prod. 1947-51 (millions of dollars) | Change in prod. 1946-51 (1,000 bbl. daily) | Expend. per daily barrel inc. in prod. |
|---|---|---|---|
| **THE INTERNATIONAL COMPANIES** | | | |
| Jersey Standard | $1,300.2 | 258.4 | $5,030 |
| Texas | 507.9 | 85.4 | 5,950 |
| California Standard | 409.3 | 54.7 | 7,480 |
| Gulf | 521.1 | 66.1 | 7,880 |
| Socony | 502.2 | 62.6 | 8,100 |
| Average | | | 6,888 |
| **INTEGRATED COMPANIES** | | | |
| Creole | 340.0 (est.) | 178.8 | 1,890 |
| Imperial | 140.0 | 54.1 | 2,600 |
| Richfield | 91.7 | 34.0 | 2,700 |
| Lion | 41.7 | 9.4 | 4,450 |
| Skelly | 152.1 | 26.4 | 5,770 |
| Shell | 337.1 | 57.5 | 5,860 |
| Indiana Standard | 499.2 | 65.2 | 7,650 |
| Atlantic | 161.6 | 21.0 | 7,700 |
| Sinclair | 226.8 | 29.3 | 7,710 |
| Plymouth | 47.0 | 6.0 | 7,850 |
| Continental | 205.7 | 24.7 | 8,300 |
| Sun | 213.8 | 25.5 | 8,380 |
| Tide Water | 99.9 | 9.8 | 10,200 |
| Union | 182.9 | 17.5 | 10,450 |
| Humble | 489.5 | 40.0 | 12,200 |
| Cities Service | 216.9 | 16.9 | 12,850 |
| Ohio | 99.4 | 6.4 | 15,500 |
| Ohio Standard | 91.0 | 5.6 | 16,200 |
| Phillips | 394.5 | 22.9 | 17,200 |
| Anderson-Prichard | 30.2 | 1.2 | 25,300 |
| Mid-Continent | 58.5 | 0.8 | 73,200 |
| Pure | 100.0 | —2.7 | |
| Average | | | 13,000 |
| **PRODUCING COMPANIES** | | | |
| Texas Pacific C. & O. | 29.3 | 6.9 | 4,250 |
| Seaboard | 73.8 | 9.4 | 7,860 |
| Houston | 36.8 | 3.8 | 9,690 |
| Texas Gulf | 17.8 | 1.7 | 10,500 |
| Amerada | 139.7 | 13.1 | 10,650 |
| Average | | | 8,590 |
| Average for all | | | 6,400 |

Note: Averages are unweighted. For the international companies the figures relate to parent companies and consolidated subsidiaries.

# Line-Pipe Needs

## Boost in output of smaller diameters needed, PAD told

MORE line pipe in sizes ranging down from 10 in. diameter must be manufactured during the next 3 years to permit crude-oil and products pipe lines to keep pace with well completions and refinery construction, the Petroleum Administration for Defense has been informed.

The survey of small-diameter pipe requirements was made by the Committee for Pipe Line Companies, under the direction of J. L. Burke, president of Service Pipe Line Co., Tulsa. The survey did not include requirements of gas lines.

The average newly drilled oil well requires 1,660 ft. or 14.16 tons, of line pipe 2 in. to 10 in. in diameter to be laid in gathering and tributary lines, though the local requirements vary

**REQUIREMENTS FOR NEW AND SECOND-HAND LINE PIPE (TONS)**

| Size (in.) | 1952 | 1953 | 1954 | 1955 |
|---|---|---|---|---|
| 2 | 7,678 | 8,523 | 9,298 | 10,040 |
| 3 | 12,486 | 13,830 | 15,083 | 16,285 |
| 4 | 73,776 | 81,265 | 88,734 | 95,891 |
| 6 | 77,530 | 81,905 | 88,630 | 95,074 |
| 8 | 123,900 | 128,726 | 135,651 | 142,288 |
| 10 | 124,569 | 133,796 | 144,624 | 155,000 |
| Total tons | 419,939 | 448,045 | 482,020 | 514,578 |
| Total miles | 8,845 | 9,512 | 10,268 | 10,993 |
| Drilling program (wells) | 50,000 | 55,000 | 60,000 | 65,000 |
| Producing wells to be connected | 23,600 | 26,000 | 28,400 | 30,700 |

greatly from field to field, the committee stated. Most salvageable old pipe already has been taken up and reused, so rolling mills should increase their output of these smaller sizes, PAD was informed.

Operators reported the greatest difficulty in obtaining 6, 8, and 10-in. pipe, and added that much steel and money would be saved, and their needs suited better, if some of this pipe were available with wall thickness less than standard weight.

The accompanying table summarizes the committee's findings. About 15 per cent of the totals shown are for products lines, averaging about 80,000 tons and 1,350 miles per year.

# Oil's Progress Outlined

## Educational activities cover nation as industry celebrates fifth annual event; leaders flay government interference

CRITICISM of the federal Government for its interference with business and for its attacks on the industry's methods of operating in this country and abroad dominated the speeches of oil-industry executives made all over the country during Oil Progress Week, October 12-18.

From oil derricks to filling stations the entire oil industry joined in telling the public about its activities, its problems, its past, present, and future. This fifth annual Oil Progress Week saw virtually every community in the nation engaging in some program of public education and public relations.

Open house was held at every sort of oil-industry installation. School children wrote essays on the industry. There were special editions of newspapers, special radio and television programs, parades, exhibits, and barbecues. Industry movies were shown, industry literature was distributed, and industry men addressed literally thousands of group meetings.

To demonstrate the slogan "Your Progress and Oil Progress Go Hand in Hand," many of the local functions dramatized the theme that "Two Equals Three," meaning that 2 gal. of gasoline today gives the same mileage as 3 gal. did in 1925.

On the West Coast a typical function was a local forum discussion sponsored by civic groups at which questions about oil were answered by a panel of exploration, production, refining, research, and marketing personnel representing a cross-section of the industry.

**What speakers said . . .** Top leaders of the industry were in heavy demand as speakers, and scores of them appeared on platforms from coast to coast. Some addressed two or three large gatherings in different cities during the week. Most of them used the occasion to explain how one or several of the federal Government's policies threatened continued progress of the oil industry.

A favorite target was the recent Federal Trade Commission report and current grand jury investigation alleging that five large companies operating abroad are engaged in a "foreign oil cartel" to monopolize the trade and raise prices.

**. . . Bruce K. Brown,** president of Pan-Am Southern Corp., New Orleans, and former Deputy Petroleum Administrator for Defense, who made Oil Progress Week speeches in Tulsa and Chicago, asserted that these cartel charges were made for domestic political effect and in disregard of American foreign policy.

While the companies confidently expect to emerge with a clean bill of health, he said, publication of unproved charges abroad will seriously prejudice foreign governments and peoples against American oil companies and hamper their foreign development work.

**. . . P. C. Spencer,** president of Sinclair Oil Corp., addressing a huge luncheon in New York on "Careers in Oil," said the drift toward a socialist state and continued government interference in oil-company management threatens to cut down the opportunities for careers in the industry.

**OIL PROGRESS WEEK in New Orleans was inaugurated as this rig spudded in just off world-famous Canal Street. The 5,000-7,000-ft. portable rig, trucked from Beaumont for the occasion, was set up completely equipped with mud pump, tanks, and other facilities.**

The cartel charges, he said, denounce the industry for doing what the State Department asked the companies to do as part of our national policy to develop new sources of oil abroad.

**. . . A. H. Chapman** of Arabian American Oil Co. said in Baltimore the nation's survival depends on obtaining foreign oil supplies and that the record disproves the charges that American companies have curtailed production and stifled markets.

**. . . Sidney A. Swensrud,** president of Gulf Oil Corp., told a St. Louis audience that the companies charged with cartel activities do not fear they will be found guilty but are disillusioned that the government which urged them to support national policy by foreign oil development has now failed to support them abroad and is charging them with illegal acts.

**. . . J. Ed Warren,** independent oil producer now serving as Deputy Petro-

leum Administrator, spoke in New Orleans on the theme that the federal Government has an obligation to provide a favorable climate for expansion of the oil industry both at home and abroad. Development of foreign oil by the companies now under attack has done much to strengthen the western world so as to prevent another war, he declared.

**. . . L. S. Wescoat,** president of Pure Oil Co., outlined in Houston a long list of government policies which he said are roadblocks to continued progress of oil, and described the cartel investigation as a political move to undermine public confidence in the industry and which threatens to undo the program of building up American interests and prestige abroad.

**SEISMOLOGISTS who participated in the prepared portion of the panel discussion held on the need for quality and quantity in velocity surveys. This panel was conducted by the Geophysical Society of Tulsa. Left to right are: Francis Cady, Carter Oil Co.; Neil Sparks, Stanolind Oil & Gas Co.; Paul L. Lyons, Anchor Petroleum Co.; John E. Owen, Geophysical Research Corp.; R. C. Kendall, Shell Oil Co.; B. G. Swan, Continental Oil Co.; and L. Y. Faust, Amerada Petroleum Corp.**

# Seismic-Problem Panel

## Seismologists agree on need for velocity control, but Lyons objects to inadequate use of geology in surveys

**Philip C. Ingalls**

TULSA.—One of the most pressing needs of seismologists today is a way to determine more accurately the velocity of sound waves generated in the search for potential oil-bearing structures. Another is a reasonable conclusion as to just how much velocity control is required for accurate mapping.

Proof that the problems are getting a great deal of attention was forcibly demonstrated at the first fall meeting of the Geophysical Society of Tulsa. This meeting featured a panel discussion on the need for quality and quantity in velocity surveys.

Though the panel offered no sure-fire solutions to these important problems, it did bring out many significant ideas, and it stimulated discussions of a nature which should some day lead to the answers.

Recognition of the need for more and better velocity surveys is nothing new, but, as pointed out by the moderator of the panel, L. Y. Faust, Amerada Petroleum Corp., the past 2 years have shown increased interest in this need as indicated by the volume of velocity information that has been made available to the geophysical industry.

Faust, author of "Seismic Velocity as a Function of Depth and Geologic Time" (Geophysics, April 1951), said that as the search for oil traps gets more exacting and big money is being spent to find the less obvious traps, it is necessary for exploration men to have more accurate information on the velocity of the seismologists' sound waves than has been required in the past.

**Why it's important . . .** Seismic surveys measure travel time of sound waves reflected from one or more horizons in the earth's crust. In order to determine the depth of those horizons at any given point, either in linear units or in time units which are comparable to those at any other point, it is necessary to know the velocity at which the sound waves travel.

Thus, if seismograph surveys made in search for oil traps are to attain their greatest value, seismologists must have reliable data on the velocity of sound waves in the rocks between the surface and the reflecting horizons at depth. It is known that velocity variations are extremely great in some areas.

Several of the panel speakers showed that if velocity variations are ignored, distortion can result which can hide potential oil traps or indicate traps that do not actually exist.

B. G. Swan, Continental Oil Co., stated that velocity surveys can be of help in detecting facies changes and locating buried positive areas which played significant parts in the formation of the rocks of an area. To support his position, he cited the October 1951 issue of Geophysics and the July 1951 A.A.P.G. Bulletin.

**How accurate are surveys? . . .** The currently employed method of determining velocity by bore-hole surveys results in inaccuracies. John E. Owen, Geophysical Research Corp., showed that shot-hole fatigue caused by rock fracturing by repeated shooting of the same shot hole increases the time for waves to reach the surface and therefore is believed to increase the time required by the waves to reach the seismometer in the bore hole.

Both R. C. Kendall, Shell Oil Co., and Neil Sparks, Stanolind Oil & Gas Co., showed that it is often difficult to determine whether an initial kick on a record has been caused by waves transmitted by the cable holding the seismometer in the hole or by those traveling through the rock section. They also pointed out that steep dips or faults in the formations penetrated can contribute to the inaccuracy of velocity surveys.

It was stated that cable kick can be eliminated often by using a section of rubber hose on the deep-hole seismometer cable. However, it seems that little can be done to allow for local geologic conditions in arriving at a velocity applicable over an area of any size other than: (1) Make velocity surveys from shot holes on more than one side of a well bore, and (2) Recognize the possible existence of these distorting factors.

**What density is needed? . . .** Adequate density for velocity surveys will, of course, vary from area to area.

Francis Cady, Carter Oil Co., showed that some areas with rapid lateral changes in velocity, due to changes in lithology or structural conditions, may require one survey to a township for accurate mapping. Other areas, where there is a rather uniform, undistorted section of rocks, may require only one

survey to four townships for adequate control.

**Geology important, too . . .** Paul L. Lyons, of Anchor Petroleum Co., threw a wrench into the society's proceedings by declaring that while the geophysical industry has need for improved velocity surveys, there is a tendency to become too dependent upon them.

Lyons, president of the local society, said there is a tendency to use velocity control as a crutch and to get bogged down with academic geophysics. He cautioned the seismologists not to forget that their main object is to find oil.

He suggested that seismologists pay more attention to the geology of the area under consideration. The mathematics of geophysics may be theoretically perfect, Lyons said, but when it is applied to finding structures in areas of complex geology it becomes more complicated and even more inexact than a geologic study.

He pointed out that what often passes for velocity variation is only thickness variation of formation units. One corollary of this is that a time "high" does not necessarily coincide with a structural high.

Lyons' views are a direct opposite of the ideas developed among some seismologists during the 1930's, when these technologists believed they could find more oil if their thoughts were not "contaminated" by those of the geologist. (For an article on development of a modern seismologist, see page 209.)

**SPEAKERS at the Tulsa A.I.Ch.E. meeting included, left to right, B. R. Carney, Warren Petroleum Corp., Tulsa; T. Weaver, Fluor Corp., Los Angeles; J. S. Bardin, Blaw-Knox Construction Co., Pittsburgh; W. I. Miller, Tennessee Gas Transmission Co., Greensburg, Ky.; C. C. King, M. W. Kellogg Co., New York; J. D. Lankford, U. S. Bureau of Mines, Rifle, Colo.; J. H. Lutz, Scientific Design Co., New York; D. H. White, Phillips Petroleum Co., Bartlesville. The meeting was held on the campus of Tulsa University.**

# Petrochemical Problem

## Shipping of ethylene and ethane is a tough obstacle, but T.G.T. low-temperature gasoline plant may provide answer

**John C. Reidel**

TULSA.—Ethane is potentially the most important liquefied petroleum gas for production of petrochemicals but its extraction and shipment present serious obstacles, the Oklahoma section of the American Institute of Chemical Engineers was told at its annual meeting here October 11.

The meeting was devoted chiefly to discussion of economics and processes for petrochemical production from L.P.G., and included papers on the manufacture of ethylene by cracking naphtha or gas oil, acetylene from natural gas by the regenerative-furnace method, and methyl vinyl pyridine from acetaldehyde or paraldehyde.

Ethane and its derivative ethylene are becoming very important as chemical raw materials, it was brought out. Present annual consumption of ethylene is in excess of 1.5 billion pounds, and more individual chemical products are made from this source than any other.

**Transportation problem . . .** However, since these $C_2$ hydrocarbons cannot be shipped as liquids in tank cars because of their high vapor pressure, ethylene is usually made near point of use by cracking more expensive propane, which can be shipped liquid.

One possible solution to the ethylene transportation problem may come from the low-temperature gasoline plant of Tennessee Gas Transmission Co. at Greensburg, Ky. A progress report on the first 10 months of operation was given the meeting by W. I. Miller and R. V. Metz of the Greensburg plant.

This plant operates on lean pipeline gas from which the liquids have been stripped in Texas but which contains ethane and propane in gaseous form. A propane-ethane cascade system furnishes refrigeration. Propane condenses the ethane, and ethane refrigerates the gas stream to about minus 100° F. Daily production averages 310,000 gal., of which 112,000 gal. is ethane.

The extracted liquid stream is piped 60 miles to the Doe Run plant of Mathieson Chemical Corp.

**New ethylene process . . .** A European process for production of ethylene by cracking naphtha and gas oil and subsequent recovery of ethylene from the cracked gases was described by C. C. King and J. Warburton of Kellogg Co.

These authors said that European chemical manufacturers have turned to cracking heavier hydrocarbon fractions while the United States preference has been to obtain ethylene from refinery gases and by pyrolysis of ethane and propane.

They described a plant of Imperial Chemical Industries at Wilton, England, which includes vapor-phase cracking with superheated steam and recovery of waste heat by quench boilers. An important feature is a low-temperature recovery system producing ethylene of 99.9 per cent purity, with recovery of more than 97 per cent.

**Cost to rise . . .** Costs of light hydrocarbons for chemical manufacture may increase, but a long-range supply can be assured at a price, it was declared by B. R. Carney and R. E. Meyer of Warren Petroleum Corp.

The use of L.P.G. for chemical purposes was between 26 and 28 million barrels in 1951 but the supply of propanes and butanes was 119 million barrels, they stated, and an estimated 230 million barrels remained unrecovered from the gas streams handled. They estimated that an additional 64 million barrels could be recovered from natural gas with a price increase of 2.5 cents per gallon.

J. G. CARRIERE C. E. WILSON B. DEWEY E. R. GILLILAND R. T. HASLAM

# New Petrochem Firm

## Grace interests to enter field with $18,000,000 plant at Memphis to make synthetic chemicals from natural gas

MEMPHIS. — W. R. Grace & Co., major shipping, industrial and trading concern with wide South American interests, has formally announced the long-heralded entry into domestic petrochemicals. A newly formed subsidiary, Grace Chemical Co., will build an $18,000,000 plant near here to synthesize ammonia and other nitrogen products from natural gas, according to J. Peter Grace, Jr., president of both companies.

The plant will be located on a 277-acre tract in Woodstock, about 6 miles from Memphis. Arrangement has been made with Davison Chemical Corp., Baltimore, to act as advisor on engineering and other matters during construction.

The plant is expected to be on stream by the summer of 1954, with construction due to begin in about 3 months. Construction payroll will average about 750 workers and operations will require about 300 employes.

Grace will obtain natural gas for conversion from Memphis Power & Light Co., which serves the western Tennessee market. The gas will come from fields in North Louisiana and East Texas. The company is expected to branch out into other phases of chemical manufacture from natural gas in the future, although in what direction its plans lie is not known at this time.

Directors of Grace Chemical include Charles E. Wilson, former president of General Electric Co. and former chairman of the Defense Mobilization Board; Robert T. Haslam, formerly vice president and director of Standard Oil Co. (N. J.), and now president of United States Pipe Line Co.; Bradley Dewey, president of Dewey and Almy Chemical Co., who was wartime U. S. Rubber Director; and Prof. Edwin R. Gilliland, dean of engineering at Massachusetts Institute of Technology. John Carriere, who is now manager of the engineering and construction division at the Atomic Energy Commission's Hanford Works, will be manager of the new Grace plant.

The new installation will contribute toward meeting mounting nitrogen needs in this country. According to the National Production Authority, the industry is building all the plant capacity possible to meet the goal of 2.93 million tons of nitrogen production annually by 1955. Plant expansion, based mainly on natural gas, is scheduled to increase by about 300,000 tons a year of net nitrogen until 1955.

# Imports Drop

## Exports also show decline during month of August

BOTH imports and exports of crude and petroleum products decreased in August, according to data compiled by the Census Bureau of the Department of Commerce.

Imports of crude and products dropped 28,000 bbl. daily from July. This decrease resulted from a reduction in product imports of 48,000 bbl. daily and a gain of 20,000 bbl. daily of imports of crude. Total imports were 89,000 bbl. daily greater than for the same month last year.

The most important shift in crude imports for the month was the large increase in receipts of crude from Saudi Arabia, a gain of 1,167,000 bbl. for a total of 3,305,000 bbl. and a new monthly record for Saudi Arabia. Also, an important trend is indicated in the continuing increases in crude imports on the West Coast. Total West Coast receipts of foreign crude amounted to 1,910,000 bbl. in August compared with 1,469,000 bbl. in July and 319,000 bbl. in August of last year.

Decreases in exports of gasoline, kerosine, distillate, and residual were larger than the increases for crude, lube oils, and other minor products for a net decrease of 1,911,000 bbl. for the month or 62,000 bbl. daily.

**IMPORTS INTO CONTINENTAL UNITED STATES**
(Thousands of barrels)

| | Aug. 1952 | July 1952 | Aug. 1951 |
|---|---|---|---|
| Crude— | | | |
| Mexico | 331 | 69 | 1,187 |
| Colombia | 1,287 | 1,407 | 1,218 |
| Venezuela | 9,940 | 10,694 | 8,702 |
| Kuwait | 2,638 | 2,832 | 2,278 |
| Saudi Arabia | 3,305 | 2,138 | 1,482 |
| Canada | 52 | 3 | 46 |
| Far East | 370 | 354 | 319 |
| Other Middle East | 201 | ..... | ..... |
| Total crude | 18,124 | 17,497 | 15,232 |
| Daily average | 585 | 565 | 491 |
| Products— | | | |
| Residual fuel | 6,656 | 7,677 | 7,359 |
| Other products | 983 | 1,445 | 427 |
| Total products | 7,639 | 9,122 | 7,786 |
| Daily average | 246 | 294 | 251 |
| Total all oils | 25,763 | 26,619 | 23,018 |
| Daily average | 831 | 859 | 742 |

**EXPORTS***

| | Aug. 1952 | July 1952 | Aug. 1951 |
|---|---|---|---|
| Crude | 1,966 | 1,876 | 2,361 |
| Gasoline | 2,184 | 2,715 | 4,093 |
| Kerosine | 524 | 795 | 1,000 |
| Distillate fuel | 2,303 | 2,963 | 3,186 |
| Residual fuel | 1,580 | 2,472 | 3,005 |
| Lube oils | 1,610 | 1,312 | 1,520 |
| Other products | 875 | 820 | 1,052 |
| Total all oils | 11,042 | 12,953 | 16,217 |
| Daily average | 356 | 418 | 523 |

*Excludes shipments to territories.

## Rank Test Gets Good Flow

DENVER.—A rank wildcat in North Park basin, Jackson County, Colorado, last week flowed 40°-gravity oil at an estimated rate of 35 bbl. per hour on drill-stem test.

Hiawatha Oil & Gas Co. announced M. E. Davis (Benedum-Trees) 1 State, NW NW 36-7n-81w, logged the pay sand, the first Frontier, at 6,884-6,908 ft. There was no apparent evidence that the gas produced on the test carried carbon dioxide as do the McCallum field wells about 20 miles to the northeast.

The Davis well indicates the first big oil find in North Park basin. It will be completed at present depth of 6,920 ft.

## Spraberry Gets Good Well

MIDLAND, Tex.—One of the highest initial oil-well potentials yet reported for the Spraberry trend in West Texas is credited to a new extension to the Aldwell-Spraberry pool of Reagan County.

The new well, George G. Johnson and Davison & Masch 3 J. F. Nunn, drew a calculated daily flow of 2,080 bbl. of 41°-gravity oil and no water.

# Big Flood Planned

## Gulf asks Railroad Commission approval of plan to inject gas and water in San Andres reservoir of Goldsmith field

AUSTIN. — One of the largest and most significant pressure - maintenance programs ever planned for a major West Texas oil field has been placed for approval before the Texas Railroad Commission.

Gulf Oil Corp. asked the commission to approve a unit operating agreement providing for water and gas injection into the San Andres reservoir overlying the south dome of Goldsmith field in Ector County. Gulf estimated initial investment at $4,279,000.

The proposed unit would cover portions of 29 sections of land totaling 14,000 productive acres. At present there are 557 wells producing from the 4,200-ft. reservoir.

All three of the field's operators, Phillips Petroleum Co., Pure Oil Co., and Gulf, have agreed to the plan. Gulf owns 78.50 per cent of the unit area and would be operator; Phillips and Pure both own 10.75 per cent.

Outstanding agreement among royalty interests also has been obtained for the proposal. For the three tracts involved in the proposed unit, royalty owners representing nearly 99½ per cent of Tract 1 have signed the agreement; more than 98 per cent of Tract 2 have signed, and more than 97 per cent of Tract 3 have signed.

Gulf asked the commission to approve a unit allowable initially of 16,253 bbl. per producing day.

**Reason for proposal . . .** Gulf engineers believe less than one-fourth of the oil in place in the unit area has been recovered since the field was discovered in 1934.

The San Andres reservoir has produced more than 68,000,000 bbl., but it is believed that possibly this much more oil can be produced with injection of water on the flanks and injection of gas into the top of the dome.

Bottom-hole pressure has fallen 624 psi. since the field's discovery to a current pressure of 1,088 psig. Pressure maintenance is expected to halt the downward trend and stabilize the pressure at about 1,000 psig.

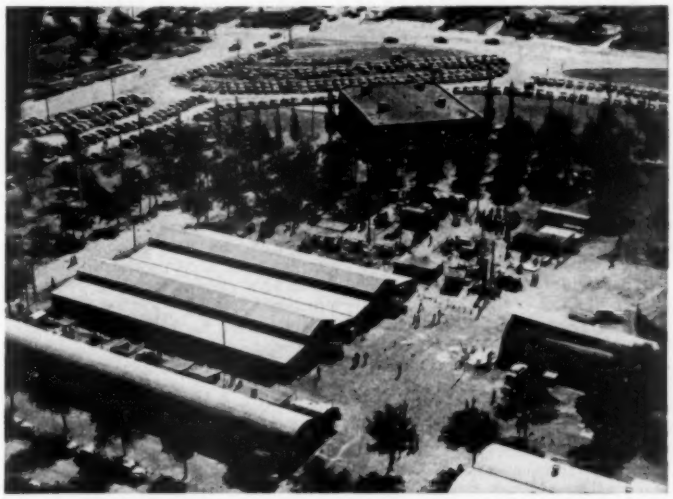
**Water supply . . .** Since there is insufficient ground water available in West Texas, Gulf plans to obtain injection water from Hendrick field, 30 miles west in Winkler County.

Hendrick, a prolific oil field 25 years ago, now produces about 500,000 bbl. of water daily from wells in their last stages of production. Gulf plans to drill 6 water wells and move between 60,000 and 90,000 bbl. of water daily through a big-inch line to Goldsmith.

At Goldsmith the water will be returned to the San Andres reservoir through some 31 input wells; 20 of these Goldsmith injection wells will be converted from existing oil wells and the remaining 11 will be drilled on the edge of the field. This plan thus develops a periphery flood to drive unrecovered oil updip to producing oil wells.

**Gas - cap pressure . . .** While water moves into the reservoir from below the field oil-water contact, gas will be introduced above the field's 140-ft.-plus oil column through the broad gas cap that overlies much of the field.

Four present producing oil wells located on the crest of the gas cap will be converted to gas injection wells. Residue gas from the nearby Phillips gasoline plant will be forced into these wells in volumes ranging from 5,000 to 10,000 M.c.f. per day.



**SITE OF THE PERMIAN BASIN OIL SHOW is Ector County Park in Odessa, which opened to a record turnout October 16.**

# Record Oil Show

## Big crowd turns out for opening of Permian basin event at Odessa; parade is highlight of opening-day ceremonies

**Roy F. Carlson**

ODESSA, Tex.—The Permian Basin Oil Show opened to record crowds here Thursday, October 16, with a giant parade of oil field trucks and other mobile equipment, high school bands, decorated floats, and groups of mounted horsemen.

The show, designated the "Old Field Workers' Show," began in 1940 and 1941 as the Little International Oil Show. It was discontinued during the war but was revived in 1950 under the present name. Although under the sponsorship of Odessa and the Odessa Chamber of Commerce, the show is run by a board of directors on which are representatives from communities scattered throughout the Permian basin.

**Meetings . . .** The show is held to coincide with part of the nationwide

observance of Oil Progress Week, and meetings of organizations allied with the oil industry are normally held during or near the show dates.

The Instrument Society of America held a dinner meeting Tuesday, October 14, with Lyle Eige, of Fisher Governor Co. as guest speaker. The Permian Basin Chapter of the American Petroleum Institute met Wednesday, October 15, with E. I. Thompson, executive vice president of the Texas Independent Producers and Royalty Owner's Association, as guest speaker and the Blondie and Dagwood radio show as entertainment.

The Permian Basin chapters of the Desk and Derrick Club, American Association of Oilwell Drilling Contractors, American Institute of Mining and Metallurgical Engineers, and West Texas Geological Society scheduled a joint meeting Friday, October 17.

**Equipment . . .** Wares of more than 500 manufacturers filled 350 exhibits of 200 different exhibitors at the show.

Equipment varying from delicate oil field instruments to a complete drilling rig were on display. All varieties of equipment in daily use in the drilling and producing and allied industries were moved in for the start of the show. Five buildings, a tent and open-air spaces were made available at Ector County Park to house the exhibits.

Fulton Lewis, Jr., news analyst and commentator, addressed a dinner meeting Thursday, October 16, and conducted his radio show from Odessa at the meeting of 300 business and oil men.

# Crude Ceiling Attacked

## Money, not patriotism, finds oil, Windfohr tells Texas oil men; OPS view seen as unrealistic and shortsighted

**Carl Hoot**

FORT WORTH.—The Office of Price Stabilization is totally unrealistic in its approach to the crude-oil price problem, R. F. Windfohr, president, told members of the Texas Mid-Continent Oil and Gas Association here at their thirty-third annual meeting, held October 14-15.

"We have to send dollars to hunt oil. We cannot send patriotism, OPS directives, government reports, or resolutions," Windfohr said. "The oil-hunting dollar must come from oil's sale in the market place."

The price of crude today, he said, is artificially pegged some 25 per cent below the level of other commodities. It stands almost exactly where it did in the depression year 1938, measured by the wholesale prices of all other commodities.

"In arbitrarily holding down the price of crude," Windfohr declared, "officials of OPS are saying to the nation that they are satisfied with the supply situation both long-range and near-term; in short, that the public, as to the supply of oil, never had it so good.

"In substance, they are saying that from the standpoint of quickly available oil, we have a present productive capacity great enough to fuel another long war. The OPS may believe that, but no responsible person in the oil industry believes it."

**Engines and octanes . . .** Dr. Charles F. Kettering, vice president of General Motors Corp., told the oil men that higher-octane gasoline needed for future automobile engines does not mean that the cost of the fuel will outweigh the benefits of engine improvements.

Present improvements, such as 93-octane gasoline, are costing the motorist little more than his previous low-octane fuel, Kettering said. The 25-octane gasoline used 25 years ago would cost about $2 a gallon today, if it could be purchased.

Automotive engineers, he said, are concerned over future engines, which are known to be some 35 per cent more efficient than present models, but at the expense of higher compression ratios and subsequent higher octane-number fuel requirements.

Kettering said he believed our natural resources would some day be depleted, but that it will be a gradual process and certainly "not in our time." There is no need to worry about it, he suggested, because the future generations' need for fuel as we know it today may be compared with the present need for kerosine lamps or with modes of transportation which have passed quietly from daily use without fanfare.

**What's par for taxes? . . .** Charles E. Simons, executive vice president of the association, told members the oil industry should reexamine its state and local tax policy of "going along" with tax increases as financial emergencies arise.

At present, he said, the Texas oil industry is providing more than 30 per cent of all state tax collections. The industry, he said, should find the line that marks the boundary of a good citizen's fair share of the tax burden.

Simons listed the state's sources of revenue as: natural resources, other than oil and gas production, 2.9 per cent; gasoline, 23.5 per cent; tobacco and alcoholic beverages, 12 per cent; motor vehicle licenses and sales tax, 11.8 per cent; ad valorem tax, 8 per cent; and other sources, 11 per cent.

"In other words," Simons said, "the oil producer and the motorist, the cigaret smoker and the beer drinker are left with the check for 78 per cent of all state taxes.

Two other principal speakers were Hines H. Baker, president of Humble Oil & Refining Co., who spoke on "Statesmanship in Industry," and Reese H. Taylor, president of Union Oil Co. of California, who talked on "Oil Shale."

The oil men adopted two resolutions, one asking OPS to remove all controls on petroleum, natural gas, and byproducts, and another taking exception to the recent Federal Trade Commission report which inferred that the oil-conservation laws of Texas are employed to control markets.

All officers of the association were reelected.

## Service Awards Presented

FORT WORTH. — Texas' outstanding oil men of 1952—J. S. Abercrombie and J. L. Latimer—were presented the Distinguished Service Awards of the Texas Mid-Continent Oil and Gas Association at the association's annual meeting here October 15.

Abercrombie, philanthropist, sportsman, and discoverer of several prolific fields along the Gulf Coast, received his award as the outstanding independent of the year. Latimer, president

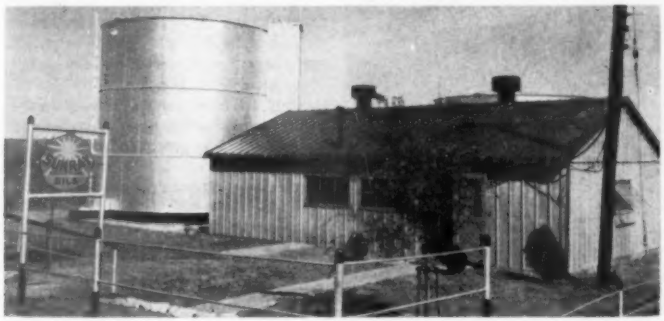
J. L. LATIMER

J. ABERCROMBIE

of Magnolia Petroleum Co., was selected as the outstanding major-company representative.

The awards are presented annually to a major company executive and an independent for outstanding service to the petroleum industry. A committee of former award winners makes the selection.

Both men started at the bottom of the oil industry and worked up, Abercrombie as a roughneck in Gulf Coast oil fields and Latimer as helper on a loading rack.



SUNRAY'S all-electric automatic water-flood pressure station serving company's 574-acre Fankhauser unit.

PHILLIPS' new water pump plant and pressure filters on the 1,040-acre Beal unit. Anticipated water input is 25,000 bbl. daily.

# Water Floods Pay Off

## Recovery techniques used in highly profitable projects in Greenwood County, Kansas, studied by 310 engineers

**Kenneth B. Barnes**

EUREKA, Kans.—The latest in water-flooding techniques and equipment were studied October 9 by Kansas-Oklahoma water-flood operators and the Kansas Section of the American Institute of Mining and Metallurgical Engineers on the annual lease trip to Greenwood County, Kansas.

In Greenwood, there are 52 separate and distinct water-flood projects. Most of these have been highly successful.

Average net sand thickness of the Greenwood flood projects is 39 ft. These water floods are shallow—1,700 to 2,500 ft.

The trip also was sponsored, and Greenwood flood data supplied, by Ward A. McGinnis, independent oil operator of Eureka. A total of 310 engineers made the 1-day trip.

Eight of Greenwood's "Golden Lane" flood projects already have recovered more than 6,000 bbl. per acre, a good figure for most current shallow-flood operations. If, on the whole, flood operations in this area obtain an average water-flood recovery of 5,000 bbl. per acre from an ultimately developed area of 20,000 acres, total water-flood oil for the Bartlesville (Pennsylvanian sand) in Greenwood County alone will total 100 million barrels.

**Shoestring-type sands . . .** Discovery oil well in Greenwood County was drilled in 1905. The first Bartlesville shoestring sand was found in 1917 (Sallyards field). Four more fields were found in 1921-1922, Aagard in 1923, and then a whole line of "Golden Lane" Bartlesville sand strippers in the middle 1920's.

**Production history . . .** All of the Bartlesville sand in these "Golden Lane" pools originally produced by dissolved gas expansion. As these solution-gas reservoirs declined, the poor wells were plugged, but in some cases upper water (Douglas sand, 800-1,200 ft.) entered and started a slow water drive.

Systematic flooding, however, was first authorized in Kansas by the Kansas Corporation Commission in 1935 on York State Oil Co.'s DeMalorie C lease in Greenwood under the engineering supervision of Dr. George H. Fancher, Penn State College. This former Mid-Continent area flood has now recovered more than 8,000 bbl. of oil per acre. It is still producing, operated by Phillips Petroleum Co.

Gas repressuring in the Golden Lane fields was started in the early 1930's. While most of these projects were fairly successful, they now have been generally discontinued in favor of higher oil production and ultimate recovery secured under water-flood operation.

**Recovery figures . . .** Greenwood County has produced 178,000,000 bbl. of oil. Water flooding, starting from the initial York State operation in 1935, now totals 24,500,000 bbl. The water-flood recovery has required the injection of 211,000,000 bbl. of water

**Three projects studied . . .** The Kansas-Oklahoma water flooders and the A.I.M.E. group inspected three large and well-engineered projects — each differing in equipment layout and operational features. All three were "Golden Lane" Bartlesville flood projects.

**Sunray Oil Corp. . . .** The Fankhauser unit water flood inspected has 25 oil wells, on 10-acre spacing. For the flood, 22 water injection and 4 water-supply wells were drilled.

Before flooding, the property averaged 34 bbl. per day; peak oil production under flooding hit 1,797 bbl. daily. Secondary-recovery operation produced 1,166,300 bbl. of oil during the period, 5,248,300 bbl. of water was injected (2,554,500 bbl. of this was produced water). Net sand thickness averages 24.2 ft., porosity 20 per cent, permeability 78 md.

The Sunray properties are fully electrified (both oil wells and water-pressure plant) and virtually automatic.

**Cities Service Oil Co. . . .** This project comprises the "Madison Block," taking in 11 leases, 42 producing oil wells, 31 water-input and 3 water-supply wells. Gas repressuring was started in 1931; in 1948, water flooding was started by converting seven oil

**CITIES SERVICE'S 1,440-acre Madison Block flood. Photos show inspection party on annual tour.**

wells to water input, on 20-acre, 5-spot pattern. At present, the flood project is two-thirds developed (1,131 floodable acres).

Produced and fresh water are mixed, treated (with alum), and gravity filtered.

The gas repressuring recovered 1,477,959 bbl. oil. Production before flooding was 200 bbl. oil daily. In July of this year it averaged 580 bbl.

**Phillips Petroleum Co. . . .** Phillips Petroleum's Beal unit comprises seven leases totaling 1,040 acres of which 153 acres now are being flooded. Well spacing is on 10-acre basis, for like wells.

For water supply, Phillips drilled an Arbuckle limestone supply well which is produced by a 135-hp. Reda pump. Arbuckle and produced water are mixed and then aerated to remove iron, hydrogen sulfide, and carbon dioxide. Treatment of 1 lb. of lime per 10 bbl. of oil is made.

Primary oil production from 545 acres was 4,200,000 bbl. (about 7,700 bbl. per acre). Before flooding, Phillips' Beal Unit made 95 bbl. oil daily; last month, this water-flood project hit 2,784 bbl. water per day.

Cumulative water-flood oil production has been 345,674 bbl. (about 2,259 bbl. of oil per acre so far). Cumulative water input is 2,904,683 bbl. The Beal Unit has 59 oil wells and 13 water input wells.

# Asphalt Uses Growing

## Sound deadeners, irrigation-ditch linings among latest developments; sulfur recovery attractive, W.P.R.A. told

**F. Lawrence Resen**

EL DORADO, Ark.—In one field of asphalt specialties there are "about as many specifications as there are manufacturers and consumers combined" Auburn Baccus, Berry Asphalt Co., told refinery technicians here this week.

Uses of asphalt specialties for industrial purposes are unlimited, Baccus reported to the Western Petroleum Refiners Association group at its regional meeting October 16-17. Interest in this field is not only with asphalt refiners but with light-oil refiners as well. This is because manufacture of these specialties calls for use of various solvents, wax distillates, and lubricating oils. In many cases even petroleum resins are utilized in production of asphalt specialties, Baccus pointed out.

One of the newer and fast-growing uses of asphalt is undercoaters and sound deadeners for automobiles. Prior to 1945, asphalt was utilized for this purpose on a limited scale. Today, undercoaters and sound deadeners of this type are used extensively by the automotive industry. This use of asphalt along with that of linings for irrigation ditches were among the newer ones discussed.

**Closed dehydration system . . .** Dehydration of liquefied refinery gases and other volatile hydrocarbons, via a closed system requiring no extraneous gas for desorption, eliminates danger of product and desiccant contamination. Layton Boyd, Born Engineering Co., advised the W.P.R.A. group. This method of operation also eliminates introduction of liquid hydrocarbons to the fuel system or to process recycle, Boyd indicated.

Even in operations where dry stripping is used, Boyd brought out, occasional plant upsets allow residual moisture to find its way into the product. This occurs from moisture in the oil entering the still and thence to the depropanizer overhead. In cases where operations are carried out by prefractionation of the total oil stream, product deethanization is eliminated and propane is the overhead product from the first fractionator. Where steam is used for stripping, overhead propane will be saturated at the temperature existing in the reflux accumulator.

In a specific case involving propane dehydration, cited by Boyd, the recovery of propane per cycle was 70 gal. on a 1,000-bbl. per day unit. On a daily basis this recovery amounted to 210 gal. and at a price of 4 cents per gallon, represented $8.40. Based on 1,000 B.t.u. natural gas, priced at 15 cents per 1,000 cu. ft., the propane was valued at about $2.90, or a difference of $5.50 daily, which was ample to offset additional cost of the closed system.

**Sulfur economics . . .** "The economics of sulfur recovery look attractive to refiners having 10 or more tons per day of sulfur available as hydrogen sulfide," J. H. Eppard, Blaw-Knox Construction Co., stated during the session on "Technical Topics."

Eppard presented an economic analysis of a 12.9-ton per day sulfur-recovery plant geared for operation in a complete 20,000-bbl. per stream day refinery.

General qualifications of the refinery on which Eppard based his economic study called for catalytic cracking facilities and gas-treating equipment for removing $H_2S$ from the fuel gas and from the cat poly unit feed. Sulfur content of the crude oil processed in the refinery was set at 2.0 weight per cent. Utilities for operating the plant were assumed to be available from a central location.

Further qualifications included 14.7 long tons per day of $H_2S$ available for conversion to free sulfur. Stream time at 90 per cent was used by Eppard in his calculations.

On a plant investment of $120,000 and with the sulfur product valued at $22 per ton, Eppard's figures showed a net profit of $42,290 before taxes. Payout before taxes ran to 1.95 years and after taxes to 3.04 years. Raw materials were valued at $1.50 per ton of product. Amortization figures were based on 70 per cent in 5 years. Eppard pointed out that the economics naturally improve as the size of the unit is increased.

# Gas Line Nearer

## Westcoast clears all Canadian hurdles for moving Alberta gas to U.S., now needs only FPC approval to begin project

**Henry D. Ralph**

CALGARY, Alta.—All Canadian obstacles have now been cleared away for construction by Westcoast Transmission Co., Ltd., of a natural-gas pipe line from northern Alberta and British Columbia to Vancouver, Seattle, and Portland.

The final step remaining before construction can start is approval by the U. S. Federal Power Commission of the United States portion of the line. The FPC began hearings on Westcoast's application last June but suspended them because the company did not have complete Canadian approval.

Last week the dominion Board of Transport Commissioners in Ottawa issued Westcoast a permit for interprovincial transportation of gas and for its export to the United States.

**Reserves estimate . . .** This action was based on a new estimate of gas reserves in the Peace River area, from which Westcoast proposes to take its gas, just completed by Dr. G. S. Hume, Director General of Scientific Services of the Canadian Government.

Hume's report estimated proven gas reserves in the region as 2.5 trillion cubic feet—1.6 trillion in British Columbia, and .9 trillion in Alberta. The board also noted that since the date of the Hume estimate, August 31, two significant discoveries have been made in the area which should further enlarge the reserves for the pipe line.

Last March the Alberta government gave Westcoast a permit to export 42 billion cubic feet a year from the Alberta portion of the Peace River area. This volume by itself was not enough to make the pipe line economic, a fact which was played up by opponents of the project. Westcoast was relying on gas from new fields in British Columbia, but it had no impartial, official estimate of these reserves.

Now that Westcoast has the full approval of all Canadian authorities concerned and has proof of adequate reserves to support its pipe line, it is expected to ask immediate resumption of hearings before the Federal Power Commission.

**Two rivals . . .** Two other pipe-line proposals are opposing the Westcoast project before FPC, as the record stands at present.

**ROUTE of the proposed Westcoast Transmission Co. line from the Peace River area to Portland.**

The more important is Pacific Northwest Pipe Line Corp., which is seeking a certificate to construct a gas line from the San Juan basin of New Mexico, Arizona, Colorado, and Utah to serve Washington and Oregon—including the Portland and Seattle markets which are vital to Westcoast's project. This project is backed by Ray Fish of Houston, who has had considerable success in pipe-line promotion, and is now actively attempting to line up sufficient gas reserves to win FPC approval.

A second rival at the FPC consolidated hearings last June was Northwest Natural Gas Co., a firm organized by A. Faison Dixon of the New York Engineering firm of Brokaw, Dixon & McKee. Northwest Natural proposed a line from southern Alberta, going south of the United States border to avoid the Canadian Rockies, and serving the same markets as Westcoast plus Spokane and other markets in eastern Washington and British Columbia.

Northwest had the support of some of the largest holders of undedicated gas reserves in southern Alberta, and claimed it could serve more producers and more consumers and build a shorter and more economical line. However, the Alberta government denied Northwest the necessary export permit, and while the company has permission to renew its export application next March, the general belief is that this project is virtually dead as a result of Westcoast's head start.

**The project . . .** Westcoast Transmission Co., Ltd., is backed by Pacific Petroleums, Ltd., of Calgary, and associated companies, including Sunray Oil Co. of Tulsa. These companies have developed major gas reserves in both the Alberta and British Columbia portions of the Peace River area and have commitments to purchase gas from other producers in the region.

The company plans to build a 1,000-mile trunk line starting close to the southern terminus of the Alaska Highway near Dawson Creek, B. C., on the Alberta-British Columbia border. It will be a 24-in. line with initial capacity of 190,000 M.c.f. per day which can be expanded to 400,000 M.c.f. with additional compressor stations. Estimated cost is $111,000,000.

The route goes through British Columbia, chiefly through north-south mountain valleys and across relatively low passes, and crosses the United States border near Sumas, Wash., about 40 miles east of Vancouver, B. C. Most of the survey and right-of-way work has been completed.

**FPC position . . .** Last June the Federal Power Commission held hearings in Washington on Westcoast's application, but the proceedings were complicated by the intervention of half a dozen other companies, including Pacific Northwest, Northwest Natural, and others interested in projects involving other parts of Canada and the United States.

The hearings were halted when the

commission's attorney moved to dismiss all applications on the ground that no one had complete assurance of an adequate supply of gas. Westcoast had Alberta export authorization but lacked dominion permits, Northwest Natural had neither, and Pacific Northwest, an all-American project with no international complications, lacked adequate reserves in the San Juan basin.

The commission itself has not ruled on its attorney's motion, but now that Westcoast can display its Canadian permits and the Hume report, the commission is expected to reopen the case shortly.

**Current activity . . .** This situation has caused feverish activity at both ends of the Rocky Mountain chain during the past several months as the two main rivals for the Puget Sound market have attempted to improve their reserves position.

Up in the Peace River area of the far north, Pacific Petroleums has made important gas discoveries in the vicinity of Fort St. John, B. C. It has proved up at least one really major field and has brought in large shows of gas from other structures. Other operators are also active in that general region.

At the same time, Pacific Northwest has obtained tentative purchase commitments from distributors of manufactured gas in some of the principal markets which both lines propose to serve. It has no present plans to serve Vancouver, B. C., and the line probably would be economic without that market. Westcoast, on the other hand, could not survive on British Columbia markets alone, and must reach Seattle and Portland to pay out.

But Pacific Northwest must also show the FPC that it has adequate gas reserves dedicated to it, and it was unable to do so at the June hearing.

Since then the concern has been actively scouting the Four Corners region for gas commitments, and undoubtedly has made progress. But El Paso Natural Gas Co., which has a trunk line running through the New Mexico and Arizona parts of the San Juan basin, is also trying to tie up gas reserves in the same general area.

Both El Paso and the California utilities which take its gas are expected to intervene before the FPC and oppose the Pacific Northwest project on the ground that San Juan basin gas should be dedicated to the future needs of California.

**Legal problem . . .** There is one other legal gimmick which could make some trouble for Westcoast Transmission. This is the Canadian Electricity and Fluids Export Act of 1909. This dormant and almost forgotten statute prohibits the export of any fluid—and that includes gas—except in quantities certified by the federal Department of Trade and Commerce as being surplus to the nation's needs, and certificates must be renewed every year.

**NEW GAS supplies for the proposed Westcoast Transmission gas line to Seattle and Portland are assured by new discoveries near Fort St. John, B. C., such as this well recently brought in by Pacific Petroleums, Ltd.**

Attorneys for the rival Pacific Northwest project make much of this. They say the FPC can never approve any project, depending on Canadian gas, because Canada might sometime chop off the supply without notice.

This ignores the fact that Canadian electricity has been used in Seattle and Niagara Falls for many years without any interruption. Furthermore, C. D. Howe, dominion Minister of Trade and Commerce, has let it be known that he is prepared to give assurance to the U. S. State Department that the flow of Canadian gas will never be stopped by this law if the FPC approves Westcoast's line into Washington and Oregon.

**Route and plans . . .** The Westcoast project has been engineered by Ford, Bacon & Davis, Inc., of New York. An economic survey showed that the region proposed to be served has a minimum market of 39 billion cubic feet per year (110,000 M.c.f. per day) during the first year of natural-gas service, increasing to 67 billion (230,000 M.c.f. per day) in the fifth year of operation. This includes Vancouver and small communities along the route in British Columbia, plus the string of towns along the United States Pacific Coast from Puget Sound to Portland, Ore.

Starting close to where the Peace River crosses the British Columbia-Alberta border, the main trunk line would run 680 miles south to the United States boundary near Sumas, Wash., plus a 40-mile branch to Vancouver. The route crosses the Continental Divide through Pine Pass along the new Hart Highway, and then goes south along highway and railroad routes through Prince George, crosses the Thompson River near Kamloops, and follows the Canadian Pacific Railroad through Coquihalla Pass to Hope.

Coquihalla Pass is also the route of the Trans Mountain crude line now being laid from Edmonton to Vancouver. In case it is inadvisable to lay two pipe lines along the railroad in this pass the Westcoast line will detour to the east via Princeton, adding 50 miles to the trunk line.

South of the international boundary the 277 miles of trunk line will be built and operated by an American subsidiary, Westcoast Transmission Co., Inc., which will sell gas to local distribution utilities along the route.

The Westcoast project does not now contemplate serving areas in eastern Washington, although the Pacific Northwest and Northwest Natural projects do. However, another affiliate of Westcoast, Trans-Northwest Gas, Inc., proposes to tap Westcoast's trunk line in southern British Columbia with a line going south through Grand Coulee to the atomic energy plant at Hanford, Wash.

From Grand Coulee a branch would run east through Spokane, Wash., to Coeur d'Alene and Wallace, Ida., and from Spokane another branch would go north back into British Columbia to serve the big smelter at Trail.

## Regina Expansion Slated

REGINA, Sask.—Saskatchewan Federated Co-Operatives, Ltd., has approved a $5,500,000 expansion program for its refinery here, which will raise crude capacity from the present 6,500 bbl. daily to 12,000 bbl. daily.

The project also will include a 5,000-bbl. vacuum-distillation unit and a 4,500-bbl. catalytic cracking plant. A 500-bbl. polymerization unit also will be added.

Construction is scheduled to begin in 1953, with completion set for late 1954.

# Court Ruling Contested

## Five firms accused of forming oil cartel appeal Kirkland decision denying change of venue, discharge of grand jury

Bertram F. Linz

WASHINGTON.—Five oil companies involved in the grand jury investigation of an international "oil cartel" asked the federal Court of Appeals last week to reverse the decision of Judge James R. Kirkland of the District Court who refused to discharge the jury or grant a change in venue.

The companies' appeal was heard by the court October 15 after the court granted a stay of grand jury proceedings for this purpose. Arguments of both the companies and the Department of Justice covered the same points that had been presented to Judge Kirkland, with the companies making capital of his criticisms of the department and his appreciation of the hardships worked on the companies by the all-embracing subpoenas which called for their records as far back as 1928.

Counsel for the companies told the Appellate Court that irreparable injury would result if the investigation were not quashed. They argued that "tense and delicate conditions" exist in many countries in which the companies hold important concessions and that these concessions are vital not only to the companies but to the economic and military interests of this country.

They again raised the point that 14 members of the grand jury are federal employes and predicted that no indictment could be secured by the Government in any other federal district where federal employes would not preponderate on a jury.

**Repercussions . . .** The companies took the position that any indictment in the District of Columbia would be void but argued that even so they would have been forced to an enormous burden of producing at least 50,000,000 domestic documents. Even an invalid indictment might seriously injure the value of oil concessions, the court was told, and publicity already given the inquiry has resulted in agitation for nationalization of the oil industry in Venezuela and Lebanon.

In a memorandum filed with the court, the companies asserted that the Government itself encouraged American capital to secure oil reserves in foreign countries and pointed out that the situation is being exploited by Russia to undermine the position of American and other interests in the Middle East.

The companies based their position on constitutional grounds, asserting that "the framers of the constitution were determined to prevent from happening the very situation which is presented in this case—citizens being called to a seat of a central government to answer for crimes which, if committed at all, were committed in a state."

The grand jury proceedings now are set to resume this week, after being postponed from October 13 by the appeals court. Meanwhile, the companies were hopeful that, if the Appellate Court refuses to reverse his decision on the investigation itself, Judge Kirkland will order the Department of Justice to limit its subpoenas to alleged offenses against which the statute of limitation has not yet operated rather than all activities over a period of 24 years.

# Concern Over Steel

## High price of European tubular goods—almost double that of domestic pipe—puts crimp in PAD hopes for new supply

WASHINGTON.—The current excessive price of European tubular goods has created considerable concern in the Petroleum Administration for Defense.

PAD officials are working to have the European pipe mills increase their output on the theory that if American companies operating abroad can buy more tubular goods abroad it will to that extent increase the supply available for domestic operations.

They also are encouraging domestic operators to import pipe and are permitting its use without charge against allocations.

It is estimated that approximately 100,000 tons of foreign pipe will be imported this quarter. But officials fear that prices as high as $350 a ton—about double the price of domestic pipe—will be a deterrent to any great increase in imports.

The cost of European pipe until recently was only about $15 to $20 a ton more than the price of domestic goods, officials say. But today, operators can get conversion steel at substantially less than the cost of the European product.

**No profiteering . . .** There was no intimation by PAD that the European mills were profiteering. The basic causes of the situation are believed to be a shortage of steel, an even more serious shortage of scrap abroad, and the high cost of inefficient "custom" procedures followed by the European mills.

In some quarters there is considerable resentment over the situation. It is pointed out that the Government has contributed large sums to foreign countries to develop their steel-production facilities but that, while strict ceilings have been imposed on the prices of domestic pipe, no controls whatever are imposed abroad.

PAD and the Mutual Security Agency are continuing their efforts to develop increased tubular-goods production abroad, although they appear to have no plans as yet for dealing with the price situation.

**Canadian possibilities . . .** Meanwhile, attention now is being directed toward the possibility of obtaining tubular goods in Canada. Such reports as are available indicate that Canadian mills have made some 6⅝-in. electric-weld casing and considerable line pipe but have not gone into tubular-goods production.

The matter apparently also is under consideration in Canada, where English interests are reported to be studying the financing of some tubular-goods facilities.

## OPS Seeks Oil-Price Views

WASHINGTON. — The Office of Price Stabilization has asked the Petroleum Administration for Defense to review the California oil-price situation and submit its views for consideration in connection with applications for increases in ceilings.

PAD several months ago submitted

# WATCHING WASHINGTON

**Bertram F. Linz**

## Mutual Aid

The steel industry sells a lot of steel to the oil and gas industries, but in turn it is a darned good customer for their products.

Last year the steel industry had a record production of 105,000,000 tons. All told, the oil and gas industries probably take something over 10 per cent of the steel output.

To reach that output the steel industry had to buy nearly 60,000,000 bbl. of fuel oil.

It also used some 6,750,000 bbl. of tar and pitch, 207,000,000 M.c.f. of natural gas and 27,611,000,000 kw-hr. of electric power to supplement the 100,000,000 tons of coal is consumed.

## On a Silver Platter

The Federal Trade Commission's "cartel study" is being used abroad as the oil industry and State Department fully expected it would be—as a springboard for vigorous Russian propaganda in the Middle East.

The Communists are sowing on fertile ground—beaming their propaganda toward countries which have been experiencing a wave of nationalism. The official character of the FTC report is used as the basis for assertions that the oil companies had gone so far that even the "American politicians" finally revolted.

The Red attacks are in the usual vein — British-American "imperialism," "exploitation," and violation of the sovereignty of independent nations. The Communists are following every development in the situation here, taking advantage of court suits and grand jury actions, and are expected to intensify their barrage as proceedings here give them more ammunition.

American prestige and oil-company prospects abroad are not enhanced by Russian broadcasts telling the Saudi Arabians that the companies are producing their oil at less than one-fourth the cost of production in the United States while paying native workers less than one-tenth the American wage. That is just one sample of what the Moscow propagandists are saying.

But Russian propaganda is just one gust in the international storm the FTC has raised. Latin American countries where the State Department was seeking to open the doors of oil development to American capital are more determined to keep their oil for themselves. Consuming countries have been given the impression they have been dealt with unfairly so that company profits may be increased.

Even though the companies are confident the Government's charges will be thoroughly disproven, it will take years to overcome the hates and prejudices that have been engendered.

## CMP a Fixture?

Echoes of the Controlled Materials Plan in all likelihood will continue to be heard long after CMP itself is dropped next year.

Mobilization officials are convinced that civilization has advanced so far that it is necessary for government to know at all times who is using what and how much of materials vital to war, so that in case of need a finger can immediately be laid upon those supplies that can be diverted to military use.

One of the problems encountered 2 years ago in preparing for adoption of the CMP was that of finding out who was using specific shapes and forms of metals, steel plate, nickel-bearing alloys, etc. The problem would have been even more difficult but for the fact that information gathered during the war was still usable to considerable extent.

The idea that the oil and other industries should continue to report their consumption of these items is based on the assumption that next time we will find ourselves at war without any previous warning and must be prepared to set up materials controls immediately.

The Census Bureau now is considering including this information in the data it will gather in next year's census of manufacturers. Some thought is being given to have that material kept up to date through a bureau of production and distribution which would be set up in the Department of Commerce.

a report on heavy crude which recommended an increase in ceiling prices. It now has under study an application of Standard Oil Co. of California for revision of ceilings on all crude, natural gasoline, and refined products.

OPS asked the oil agency to make an analysis of the supply of all crude and products in California and work up data as to refining capacity in relation to crude availability and refinery throughput in the several areas, together with information on the volume and origin of imports into California, by classification, and exports from the state.

PAD also was asked to report on the amount of crude production existing in the West Coast area and that which may be made available in relation to current and forseeable sources of supply. This would cover the position at this time and for 2 years in the future.

# FPC Overruled

## Northeastern wins round in battle over New England

WASHINGTON. — By refusing last week to review the litigation between Northeastern Gas Transmission Co. and Algonquin Gas Transmission Co. as to which shall deliver natural gas to certain sections of New England, the Supreme Court throws the whole matter back to the Federal Power Commission.

The disputed areas comprise about one-half of a four-state area in New England. FPC gave Algonquin exclusive permission to serve the area in February 1951.

Northeastern immediately went to court to contest the ruling on grounds that its application to serve the same territory had not been properly considered by FPC.

Northeastern already had been granted (in November 1950) the right to serve the other half of the New England territory. It claimed the commission should be required to explain the departure from its previously announced policy to have the whole of New England served by one company.

An appeals court agreed last February with Northeastern's claim that it had not received a full hearing in the case and ordered FPC to reopen the matter. The Supreme Court's refusal to consider the case in effect affirms the lower court's decision.

The matter is complicated by the fact that Algonquin already has gone ahead in its program of securing gas deliveries from Texas Eastern Gas Transmission Co. and markets and facilities in disputed portions of New England.

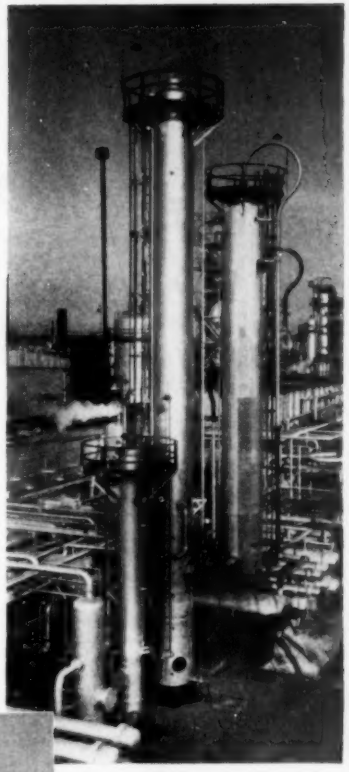
# COSDEN remodels with HORTON structures

Facilities for a greatly-increased output of higher grade motor fuels are the result of a $3,000,000 modernization program at the Cosden Petroleum Corporation's Big Spring, Texas, refinery. Among the modern Horton* tanks and plate work structures which added to the success of this program are the primary absorber, the Hortonspheroid, and the Horton Vaportank shown on this page.

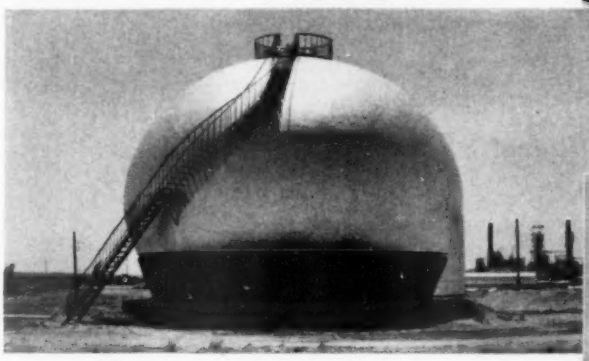
When remodeling this 18,000 bbl. per day refinery, Cosden Petroleum Corporation did so with an eye to public relations. The refinery control room was built about 200 feet back from U.S. Highway 80 with a large picture window across the front. Special lighting of the interior makes it plainly visible from the road. This ultra-modern control room has created such a high point of interest that passing motorists even draw up their cars to watch a refinery in operation.

Throughout the petroleum and petrochemical industries, Horton structures are playing a vital part in helping to increase production and to attain new operating efficiencies. Whatever type of structure you need—refinery tower, storage tank, or other process equipment—our shops have the necessary modern facilities to do the job . . . and do it right. We build structures to meet API or ASME codes or exacting customer specifications. For further information on any Horton structure, write our nearest office.

**Registered U.S. Patent Office*



*Above: The tallest tower is a 4 ft. 6 in. diam. by 58 ft. primary absorber built for the Big Spring refinery.*



*Above: 10,000-bbl. Hortonspheroid installed for the Cosden refinery in Big Spring, Tex., used for storing natural gasoline at 15 lbs. per sq. in. pressure.*

*Right: 46-ft. diam., 50,000-cu. ft. Horton Vaportank at Cosden Petroleum Company's Big Spring refinery. It is interconnected to the vapor spaces of adjacent fixed roof tanks.*

## CHICAGO BRIDGE & IRON COMPANY

*Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA*

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston, 2.....2119 C & I Life Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3.....1615-1700 Walnut Street Bldg.
San Francisco, 4.....1554—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg
Washington 6, D. C.....1139 Cafritz Bldg.

*REPRESENTATIVES AND LICENSEES*

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo N.V., 21, Amstel, Amsterdam (C) Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland
Sociedade Chibridge de Construcoes Ltda., Av. Franklin Roosevelt, 194-S/704-C, Rio de Janeiro, Brazil

WHERE *Visco* TREATMENT PAYS OFF

PAYOFF on any lease is treated oil acceptability . . . and that is where Visco Emulsion-Breaker speed and efficiency give you assurance that every tank is sold, every time.

Get Visco treating advantages on your lease now — to assure consistent payoffs at the pipelines . . . And to prove, on *your oil*, that real emulsion-breaker economy shows up in the cost per barrel of dry oil *sold*.

VISCO PRODUCTS COMPANY
INCORPORATED
City National Bank Building
Houston 2, Texas

Phone Houston, CAPITOL 7300, collect, for Visco Service that matches Visco Chemicals — fast, efficient, economical!

*Visco* CONSISTENTLY EFFICIENT
DEHYDRATING AND DESALTING CHEMICALS

**NOTICE:** Visco Products Company is authorized to manufacture and sell Visco Oil Treating Compounds for use in the breaking and resolving of oil emulsions, or to grant licenses for each use, under the following United States Letters Patent: 2,050,639; 2,060,640; 2,206,589; 2,214,783; 2,214,784; 2,225,189; 2,303,414; 2,307,813; 2,318,034; 2,318,035; 2,321,054; 2,395,254; 2,454,808; 2,514,399. Visco Products Company is willing to grant licenses on a royalty basis, to oil companies, and to others desiring to practice the patented subject matter, under any and all of the above Letters Patent, permitting the user to purchase the oil treating compounds at will from any vendor, or to prepare the compounds for use or to use the compounds under the above Letters Patent. Application for license should be made to: **Visco Products Company,** Houston, Texas.

# New Process Needed

## Lynch tells California gasoline men improved quality and lower production costs needed, sees bright L.P.G. future

D. H. Stormont

LOS ANGELES.—Most needed development in the natural-gasoline industry is a new process which would markedly lower costs and improve the quality of production, J. F. Lynch, president of La Gloria Corp., Corpus Christi, told members of the California Natural Gasoline Association in its annual fall meeting here October 10.

There is a certain amount of originality in its processes, he said, "but the manufacture of natural gasoline has been copied and is an amalgamation of ideas from other petroleum and processing industries."

Attempts to improve processing, he stated, have resulted in hypersorption, further refrigeration, and better choice of absorption oil. But there is still a pressing need to produce more material more cheaply, particularly in the L.P.G. range and with special emphasis on propane and ethane recovery.

Lynch, who is also president of the Natural Gasoline Association of America, felt this might be brought about by giving more latitude to contractors in their design of plants. He also suggested that owners help in promoting the use of new ideas rather than making the contractor stand full financial responsibility. In the search for new processes he further suggested that engineering physics be utilized to a greater extent.

**Importance increasing . . .** The natural-gasoline industry is becoming an increasingly important factor of the petroleum industry he stated, adding that it is now supplying a large part of our entire fuel economy. He then quoted the results of studies which indicated the industry's load would be even greater in coming years.

"Extrapolating past trends to 1960, it is concluded that our natural-gas reserves will be 72 per cent of the total petroleum. In 1930, they were 34 per cent. Projecting this trend in billions of barrels of reserves, it would appear that in 1960, we would have 42 billion barrels of crude as compared with 28 billion barrels today, and 112 billion barrels of natural gas and natural gas liquids in equivalent B.t.u. basis as compared to 52 billion barrels today."

In discussing the ever-present storage problem, Lynch described how La Gloria Corp. created a storage reservoir in a producing formation which has solved its problem to a considerable extent.

"Our gas comes from one of the major anticlinal structures which has about 40 productive sands. The known sands range in depth from 5,500 to 9,000 ft. Often, the higher the sand on structure, the smaller the reservoir, so we perforated the two top sands and dually completed a well in them. We put propane in one completion and butane in the other.

"We take the propane or butane back through our plant separators and have it so piped that we could put it through our fractionating system but have found this usually unnecessary. We have recovered in excess of 85 per cent with reprocessing and now closely approach 100 per cent by reprocessing."

## Drilling Drop Indicated

LOS ANGELES.—California drilling activity, already trailing that of a year ago at this time by 50 wells, is expected to lose even more ground during the last quarter.

This downward trend was indicated in the quarterly report of the Conservation Committee in which anticipated new well completions are listed. Last year's forecast showed operators planned to complete about 500 wells during the last 3 months, almost 100 more than the recent report shows for this year.

## Monterey Trial Blocked

SANTA ANA, Calif.—Presiding Superior Judge Kenneth E. Morrison has set October 30 as date for hearing arguments as to whether City Judge Elmer Hughes of Seal Beach shall be prohibited from bringing Monterey Oil Co. to trial for allegedly violating city statutes in its offshore drilling operations.

In an earlier action, Judge Morrison already had blocked the trial temporarily.

Morrison issued the temporary writ on Monterey's claim that it has a valid lease for offshore drilling approved by the State Land Commission, that the City of Seal Beach does not have title to the submerged lands and so cannot control them, and that its operations are backed by both state and federal governments.

The case was undertaken by the city against Monterey on the dual contention that the preparation of a drilling island 1½ miles offshore for oil exploration violated an antidrilling ban and that the company had not obtained a city building permit.

City Judge Hughes had set the trial for October 10 after refusing to dismiss the complaints September 26.

Monterey intends to drill three exploratory wells from its $1,000,000 island. Contract for construction of the 75-ft. diameter structure is held by Healty-Tibbitts.

# Stocks Increase

## Imports are responsible, as output is below demand

LOS ANGELES.—Stocks of crude and products on the West Coast gained 95,000 bbl. daily in August, but the increase was made possible by receipts from outside the district, according to the monthly report by the Bureau of Mines.

Total production of crude and natural-gas products in August amounted to 1,054,500 bbl. daily. Total demand, including military purchases as well as all exports, averaged 1,064,700 bbl. daily, indicating that there would have been a decrease in stocks of 10,200 bbl. daily if there had been no receipts from outside the district.

Military demand, supplied by California refiners and included in total demand for the district, averaged 79,200 bbl. daily in August compared with 82,500 bbl. daily in July and 100,400 bbl. daily in August 1951.

For the 8-month period through August, total production in California averaged 1,061,000 bbl. daily or 14,000 bbl. daily more than for the same period in 1951. Receipts from outside the district average 70,000 bbl. daily compared with 34,000 bbl. daily last year.

On the other hand, total demand was less than in 1951 by 25,000 bbl. daily. These increases in supply, combined with the decrease in demand, made it possible to add 40,000 bbl. daily to inventories for the first 8 months of this year compared with stock decreases averaging 35,000 bbl. daily last year.

The drop in demand was due to a decrease in military purchases in District 5. Deliveries for military use were about 39,000 bbl. daily less this year than in 1951.

# INTERNATIONAL

## MIDDLE EAST

# Iran Breaks Relations

### Mossadegh takes action following British rejection of Iran's "last offer" demanding payment of $137,200,000

IRAN last week broke diplomatic relations with Great Britain, blasting hopes of industry leaders and diplomats that a settlement of the oil-nationalization issue might be reached.

Premier Mohammed Mossadegh announced the decision by radio October 16. His message was to have been addressed to the Majlis, but no quorum was present for the parliamentary meeting.

Mossadegh's action was taken after consultations with the Iranian shah, the parliamentary joint oil board, and the cabinet. It followed the arrival of a British note rejecting Mossadegh's earlier demands for a cash payment of $137,200,000 as a basis for continuing negotiations toward a settlement of the oil issue.

The British note explained why Britain does not intend to meet Iran's demand for money. However, the British again left open the door to possible future negotiations if Iran is ready to modify its position.

**What Iran demanded . . .** A week earlier, Mossadegh restated his demand that Britain pay Iran $137,200,000 and stipulated that $56,000,000 of this sum be delivered at once. By paying the $56,000,000 within the 6-day deadline, he said, Britain could dispatch a negotiating team to Teheran to work out details of a settlement within the other conditions imposed by Dr. Mossadegh.

Mossadegh's message also provided that the negotiators which Britain would send to Teheran would have 3 weeks to work out a basis for settling Britain's compensation claims and the counterclaims raised by Iran. At the end of that time, Britain would be obligated to pay the remainder of the $137,200,000.

While the concession was still being operated, Anglo-Iranian Oil Co., Ltd., accumulated the $137,200,000 on its books as money that might eventually be due Iran. In London it was explained that three-fifths of the total represented the amount to be paid to Iran on expiration of the concession in 1993 or in case of its termination by agreement. The remainder was money which would become due if the 1949 supplemental agreement raising royalties were accepted. This latter agreement was never approved by the Iranian Parliament.

**Rebellion thwarted . . .** Early last week the Iranian Government announced it had forestalled a plot to overthrow the Mossadegh regime. It arrested a retired general and three other men. Dr. Mossadegh's new foreign minister, former deputy Prime Minister Hossein Fatemi, hinted that the revolt had been instigated by the British.

The new foreign minister is strongly anti-foreign.

## EUROPE

# Field Work Begins

### American firms prepare for December drilling in Spain

SEISMOGRAPH equipment was scheduled to be unloaded at Barcelona, Spain, in mid-October for the exploratory program being launched by several Texas firms in the Ebro River Valley of northern Spain *(The Oil and Gas Journal, October 6, page 82)*.

Interested in the program are: General American Oil Co. of Texas, DeGolyer & MacNaughton, Texas Instruments, Inc., and Delta Drilling Co. The concession covers about 180,000 acres southeast of the town of Logrono.

It was reported in Madrid that geological field work now is being carried out under the direction of E. R. Scott, of DeGolyer & MacNaughton. Actual drilling is expected to begin late in December with equipment supplied by the Delta company.

**If oil is found . . .** Spanish sources reported that the contract which the Texas group signed with I.N.I. (the government Institute de Nacional de Industria) provides for the formation

## Argentine Officials Get I.P.E. Invitations

**This group of officials of Yacimientos Petroliferos Fiscales, Buenos Aires, Argentina, as they received invitations to the 1953 International Petroleum Exposition from Oscar B. Irizarry, editor of Petroleo Interamericano, Latin American affiliate of The Oil and Gas Journal. Invitations to the event, scheduled May 14 to 23 in Tulsa, were from Oklahoma Governor Johnston Murray and W. G. Skelly, exposition chairman. From left to right are: Rodolfo Martin, chief of the geophysical department; J. Inigo, assistant chief of the drilling department; I. J. Teitebaum, chief of the drilling department; Dr. J. J. Zunino, chief of the geological department; Irizarry; Dr. Oswaldo Braccaccini, assistant manager of Y.P.F.; Jose M. Messone, chief of the production department; Dr. Altavino Catinari, inspector of geological work; Socrates Broullon, production superintendent; and Blas Berardineili, chief of gas services and distribution. General Manager Juan B. Siri could not be present for the photograph.**

of a company with United States and Spanish capital in case oil is found. I.N.I. would receive about 55 per cent of the stock, and the Spanish Government oil-distribution company, Campsa, would market the production at world prices.

American interests would be allowed to withdraw profits in dollars, but in this connection the agreement provides that Spain's foreign-exchange position must not be prejudiced. The Texas group will invest about $1,000,000 in the undertaking. Other information has indicated the American investment will be matched by the Spanish Government.

Results of previous oil exploration in Spain have not been encouraging. About 3 years ago Socony-Vacuum Oil Co., Inc., discontinued an exploratory program after two unsuccessful wells. There is no indigenous oil production in Spain at present.

## AFRICA

# Concession Shared

### Amerada, Conoco, Ohio each acquire one-sixth of Sinclair concession in Italian Somaliland; geological work starts

THREE major United States oil companies have obtained a total one-half interest in the concession negotiated earlier this year by the Sinclair organization in Italian Somaliland.

It was announced in New York that Amerada Petroleum Corp., Continental Oil Corp., and Ohio Oil Co. have each acquired a sixth share of the concession. Geological operations already are under way.

The three companies which have joined the Italian Somaliland venture are important producers in the United States. They are a significant addition to the American companies now engaged in exploratory work in the Eastern Hemisphere.

The Italian Somaliland concession is held by Sinclair Somal Corp., a subsidiary of Sinclair Oil Corp. *(The Oil and Gas Journal, May 26, page 81).* It adjoins the eastern part of Ethiopia where Sinclair has held a concession since 1945 and is now drilling its second well.

Italian Somaliland is administered by a trustee under authority from the United Nations and the Italian Government. Terms of the concession which Sinclair obtained are understood to have been granted within the petroleum regulations promulgated for the territory. Italian Somaliland is to become the completely independent state of Somalia at a date tentatively set for 1960.

The Sinclair announcement of the new participants in the concession said that the company had opened an office in the capital, Mogadiscio, under the direction of T. J. Donovan as assistant to the president. L. V. Stanford, veteran Sinclair official, is president of Sinclair Somal.

**Ethiopian test . . .** The well Sinclair is now drilling in Ethiopia is near the village of Galadi which is only 25 to 30 miles from the border of Italian Somaliland.

Results in this well are reported to be encouraging, though no definite information has been disclosed. Sinclair did considerable seismograph work following its first unsuccessful dry hole in the Gumburo area to the southwest.

Continental, Amerada, and Ohio about 3 years ago organized Conorado Petroleum Corp. to carry on foreign exploration jointly for the three companies outside the United States and Canada. However, in the case of the Italian Somaliland operation, they have taken separate interests directly. Conorado has been active in preliminary concession work in Venezuela and Peru and has been studying possibilities elsewhere.

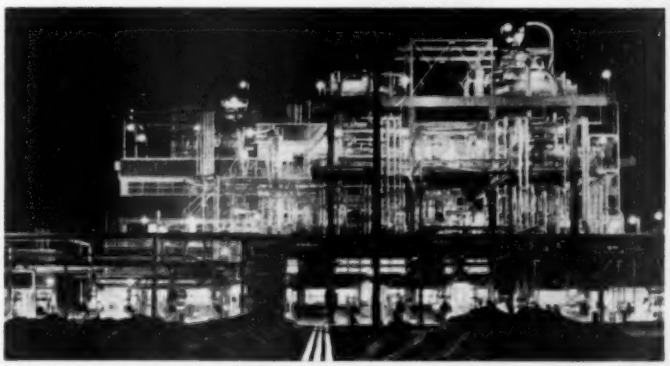
Only a few American companies outside the large international oil organizations are engaged in exploratory work in the Eastern Hemisphere. Besides Sinclair, they include the Pacific Western-American Independent Oil Co. operation in the Kuwait-Saudi Arabian Neutral Zone, MacMillan Petroleum Corp. in Sicily, and the Dallas group headed by General American Oil Co. of Texas, in Spain. The large amounts of capital required, and the large scale of most foreign operations makes groupings of the smaller companies a more feasible approach to participation in foreign ventures.

## LATIN AMERICA

### Cardon Repairs Pushed

Emergency repairs are now being made at Shell Caribbean Petroleum Co.'s Cardon, Venezuela, refinery which was shut down by a fire September 30.

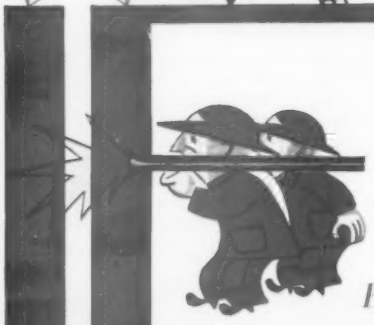
In London, Shell said it expects that the refinery will be brought back into operation before the end of October. Originally, it was feared the plant might be down several months, but replace-



### Rebuilt Dunkirk Plant Opened

**This is a night view of the lube-oil section of the reconstructed Dunkirk refinery of Soc. Generale des Huiles de Petrole in northern France opened officially early this month. The refinery is now running close to 50,000 bbl. daily. The first stage of the reconstruction was completed early in 1950 when the plant commenced operations at about 9,000 bbl. daily. The smaller of the two distillation units previously rated at about 6,300 bbl. daily is being operated at about 9,800 bbl. daily. The larger unit was designed for approximately 24,000 bbl. daily and is now handling nearly 39,000 bbl. daily. The refinery has a capacity of 5,000 bbl. daily in thermal reforming, 1,000 bbl. daily of lubricating oils, 1,000 bbl. daily of asphalts, and 60,000 lb. daily of waxes. A 5,500-bbl. Platformer is scheduled to be completed at the refinery in 1954. The operating company is affiliated with Anglo-Iranian Oil Co. Ltd.**

# GET THESE WELL PERFORATING EXTRAS *with* DOWELL *Perfo-Jet Service*



When you call for Dowell Perfo-Jet Service you get a bonus of extras which pay off in better casing perforating and open hole shooting. These extras give you more accurate gun positioning . . . maximum performance of the shaped charge . . . surer, deeper penetration . . . a junk-free hole . . . less possibility of sticking the gun . . . equipment to meet your well conditions . . . laboratory and field tested methods . . . an active safety program . . . twenty years of experience in oil field servicing.

Contact the Dowell office near you for more complete information about how Perfo-Jet and the many other Dowell Services can help you solve your production problems.

## *Here Are Extras You Get with Dowell Perfo-Jet*

**ELECTRIC PILOT EQUIPMENT**—The Electric Pilot houses instruments for finger-tip operation and the direct recording of subsurface data. The cable drum, driven by hydraulic motor, is easily and positively controlled. The Dowell sonic collar locator assures accurate gun positioning. With the Electric Pilot truck on the job, the other Pilot Services can be combined with Perfo-Jet on the same trip to your well—Permeability, Spinner, Caliper and Water Location Surveys and Selective Acidizing.

**MAXIMUM JET FORMING AREA**—The shaped charge used in Dowell Perfo-Jet guns is assembled so that the charge positioning sleeve does not obstruct the critical jet forming area. This Dowell feature allows the jet to give maximum performance—deep, sure penetration through casing and cement into the producing zone.

**SELF-DESTROYING GLASS GUN**—The expendable Glass Gun, developed by Dowell, carries a larger amount of explosive for greater penetration. When the charges are fired, the glass containers and their aluminum carrier are completely destroyed leaving a junk-free hole. Dowell Glass and steel-type guns are tailor-made in sizes and shooting patterns to fit well conditions. Perforations range from ¾" up to ⅞" in diameter.

**RETAINED, THREADED PORT PLUG**—This aluminum plug is used in the standard steel-type gun. It minimizes the possibility of sticking the gun and provides proof that a jet has been formed. When the charge is detonated, the central section of the plug is disintegrated; the remainder of the plug is retained in the gun port. The port plug with its O-ring seal has withstood pressures up to 10,000 pounds per square inch in Dowell's laboratory test well.

# DOWELL SERVICE

Acidizing • Jel-X • Electric Pilot • Perfo-Jet • Paraffin Solvents • Jelflake
Bulk Inhibited Acid • Chemical Cleaning for Heat Exchange Equipment

**DOWELL INCORPORATED • TULSA 1, OKLAHOMA**

**A Subsidiary of The Dow Chemical Company**

*"First in Oilfield Acidizing . . . Since 1932"*

*Look to* **DOWELL**

FOR OIL INDUSTRY CHEMICAL SERVICE

ment equipment has been rushed from other Shell installations in the area.

The fire started in the main power house and resulted in almost total destruction of the main switchgear. Damage was estimated at more than $550,000. The fire was believed to have been started by a short circuit which occurred when starting up one of the main 7,500-kw. generators which had been under repair.

The Cardon refinery is the largest in Venezuela. It is being expanded and early next year is scheduled to complete work which will give it a throughput of 145,000 bbl. daily, excluding 32,000 bbl. daily intake capacity on the cracking plants for heavy crude.

FAR EAST

# Damaged Plant Sought

## Shell, Mitsubishi Petroleum compete with seven Japanese firms to buy former Japanese Navy refinery at Yokkaichi

THE rivalry of two groups of companies for the right to buy the former Japanese Navy refinery at Yokkaichi in central Japan has attracted the attention of the Japanese press and public.

The Yokkaichi refinery received less damage during the war than any other of the military refineries and is equipped to produce some chemical products as well as aviation fuels and lubricants. Some of the units now are being used by a fertilizer company to produce ammonium sulfate. There is a 230-ft. pier capable of handling 6,000-ton vessels, while 10,000-ton tankers can be moored in the adjacent harbor.

One of the two groups is Mitsubishi Petroleum Co. which seeks to acquire the refinery in cooperation with the Shell organization. These two companies have disclosed they are prepared to advance a billion yen (about $2,800,000) on a 50-50 basis to restore the plant to capacity of 8,000 bbl. daily.

A spokesman for the Mitsubishi company estimated 700 million yen would be required to repair war damage and that complete restoration of the facilities would probably take 10 years—after which it was planned to resume petrochemical operations.

Seven other Japanese companies have proposed to organize a joint company to manage the Yokkaichi plant. The project also calls for a billion yen, half to be obtained by a public stock issue. This group is said to be against sharing stocks with foreign companies in principle but may seek foreign capital in the form of loans later. Three of the seven companies in this group are associated with major American oil companies marketing in Japan.

**Decision in doubt . . .** Authority to decide upon the disposal of the refinery rests with a five-man committee which has the responsibility of making recommendations to the minister of international trade and industry regarding operation and conversion of the industrial facilities formerly earmarked for reparations.

There is some expectation in Tokyo that the ministerial committee may eventually decide that Yokkaichi should be held and operated by the government itself. Others feel that the committee will postpone a decision on the question indefinitely.

The Japan Oil Refining Association said that the most important factor in the problem was the extent to which military requirements, including those for aviation fuel, would increase to meet the needs of both special procurement orders from United States forces in Japan and the Japanese Police Reserve Corps. If demand from these sources does not increase as is now expected, resumption of operations at the Yokkaichi refinery would only add to the present weak condition of the Japanese petroleum market, it was said.

# International Briefs

**Phillips Oil Co. has started construction** of an 8-mile, 6-in. crude line which will connect the company's new Bella Vista field in Venezuela with Saban field. Bella Vista, discovered this year, now has one shut-in well. Production of 42°-gravity crude is from a Miocene sand at a depth of about 3,000 ft. During the last half of this year, the company's program calls for two exploration wells with a total of about 19,000 ft. on its Venezuelan acreage, and 10 development wells.

**Mozambique Gulf Oil Co. is scheduled** to begin drilling its first test well this month. The well will be about 16 miles west of Maxixe in southera Mozambique. The company, a Gulf Oil Corp. subsidiary, has been engaged in exploratory operations in the Sul do Save area of southern Mozambique for more than 4 years and already has spent more than $3,000,000 there.

**Maruzen Oil Co., Ltd., is planning** an increase in crude-distillation capacity to 15,500 bbl. daily and the construction of a 3,000-bbl. daily fluid catalytic cracking unit next year at its Shimotsu refinery in Wakayama Prefecture in Japan. The catalytic cracking unit is to be completed by November 1953. Present capacity of the refinery is 11,500 bbl. daily. It also has lubricating-oil and asphalt manufacturing facilities. The company's second refinery at Matsuyama now has a capacity of 4,000 bbl. daily.

**Companhia de Combustiveis do Lobito** (Carbonang), an affiliate of the Belgian company, Petrofina, has received a 3-year petroleum-exploration concession from the Portuguese Government covering parts of two areas of Portuguese West Africa, the Congo district in northern Angola, and the Guanza district of the Cabinda enclave. The Angola Government will receive one-third of the gross profits of the operation if successful. The Petrofina company, which now has exploration and production interests in Mexico and Canada, is reported preparing to invest more than $7,000,000 in the undertaking.

**Petroleum Development (Trucial Coast), Ltd.,** is building a drilling camp at Tarif in preparation for its third Trucial Coast wildcat at Murbah about 12 miles from Tarif. Because of the shallow water off Tarif, cargoes are being discharged at Zubaya about 65 miles distant. The earlier well, Jabal Ali, was abandoned at 12,353 ft.

**An oil discovery behind the Iron** Curtain, in the Tutrakan district of Bulgaria near the Romanian frontier, has been reported in Vienna. Some 2,000 workers are employed in drilling operations to depths of about 5,000 ft. If the reports are true, this would be the first indigenous oil in Bulgaria.

**A 9,000-bbl. daily catalytic cracking** unit and a 3,000-bbl. daily catalytic polymerization unit are scheduled to be completed in 1954 at the new Antwerp refinery of Soc. Industrielle Belge des Petroles.

## Heads Canada Firm

### Twyman, former Chicagoan, directs McColl-Frontenac

THE president and chief executive officer of McColl-Frontenac Oil Co., Ltd., in Montreal, Que., is a native Chicagoan.

He is T. C. Twyman, 54, who was elected to head the company last spring. Twyman joined the firm in 1942 as vice president in charge of marketing and a director, and was elevated to executive vice president in 1946. He also is a member of the executive committee.

Twyman received his education at Illinois State Normal, Macomb, Ill., and San Antonio Academy, San Antonio, Tex., before joining The Texas Co. in 1930 as a real estate agent.

Later he was granted a leave of absence from Texaco to become superintendent of service stations for Indian Refining Co. In the following years he received promotions to assistant district manager and district manager, a post he held for Indian Refining Co. 4 years. He resumed active employment with The Texas Co. in Chicago in 1939 as assistant territorial manager and served there until he joined McColl-Frontenac.

Twyman, a member of the American Petroleum Institute, also serves as a director of Antilles Petroleum Co. (Trinidad) Ltd., Trinidad, B.W.I., and of Trans-Northern Pipe Line Co., Toronto, Ont.

**Sir Robert Watson-Watt,** British scientist, has been elected president and a director of New Continental Oil Co. of Canada, Ltd., Calgary, succeeding **Frank Kaftel,** former president and managing director, who has resigned both positions. Sir Robert recently resigned as director of Odeon Theatres, Ltd., the main operating company of J. Arthur Rank motion picture enterprises. He also is a member of the board of Canadian Aviation Electronics, which produces electronic and radar equipment.

**Dr. Edmundo Luongo Cabello,** technical director of economy in Venezuela's Ministry of Mines and Hydrocarbons, has been appointed head of the ministry. He was graduated from Central University in Caracas and received a petroleum-engineering degree in the United States. He succeeds **Santiago Vera Izquierdo.**

**Charles A. Herster,** design engineer in the Phillips Petroleum Co. refinery at Sweeny, Tex., has been granted a leave of absence for graduate study at Cornell University, Ithaca, N. Y.

**Ray Stottler,** Tyler, Tex., has been named district geologist for Stanolind Oil & Gas Co. at Bismarck, N. D., succeeding **L. B. Fugitt, Jr.**

**W. H. Sloan** has returned to his job as head of the new projects department in the gasoline-chemical division of Cities Service Oil Co. at Bartlesville, Okla. He has been on military duty as lieutenant colonel in the Frankford Army Arsenal in Philadelphia.

**A. B. Parker,** senior petroleum engineer for Sinclair Oil & Gas Co. at Bairoil, Wyo., has been promoted to assistant district foreman at Powell, Wyo. Other company changes include: **Orville W. Farlow, Jr.,** junior engineer at Kiefer, Okla., transferred to Lindsay, Okla.; **R. L. Losure,** assistant district foreman at Big Spring, Tex., transferred to Sterling, Colo.; **William F. Burns,** district foreman at Powell, transferred to Midwest, Wyo., **John A. Disch,** roustabout at Velma, Okla., promoted to junior petroleum engineer; **Harold E. Snider,** assistant district foreman at Sand Draw, Wyo., promoted to senior engineer at Bairoil, Wyo.; **Roscoe E. Gillespie,** junior petroleum engineer at Sand Draw, promoted to assistant district foreman; and **Cuyler G. Confer,** junior petroleum engineer at Bairoil, transferred to Sand Draw.

**Robert L. Folk,** formerly a specialist in sedimentation for Gulf Oil Corp. at Houston, has been appointed a member of the University of Texas geology staff. **Richard W. Rush,** formerly employed by Plateau Exploration Co. at Cortez, Colo., also has joined the university's geology staff.

**M. H. Smith,** formerly a geologist for Sunray Oil Corp. at Oklahoma City, has been appointed division geologist for Union Oil Co. at Bismarck, N. D.

R. T. LYONS

**Richard T. Lyons,** Houston, has been elected president, chief executive officer, and a director of Union Sulphur & Oil Corp., effective November 1. He will replace **Herman F. Whiton,** chairman of the board, who will relinquish the presidency but will remain active in company affairs. For the past 16 years Lyons has been vice president in charge of exploration in the Mid-Continent division of Tide Water Associated Oil Co. Previously he was vice president and a director of Skelly Oil Co.

**George W. Jandacek** has been appointed a chemical engineer in the research and development department of Deep Rock Oil Corp. at Cushing, Okla. He formerly was employed by a petroleum engineering company in Chicago.

**Jean L. Lee,** district manager for Bishop Oil Co. in the Williston basin, has been appointed manager of exploration for Canadian Devonian Petroleums, Ltd. Prior to joining Bishop as a geologist, he was with W. C. McBride Corp. in Tulsa.

**L. O. Wiringa,** Houston division exploration manager for Shell Oil Co., is preparing for a 6-month assignment with Bataafsche Petroleum Mij. in The Hague. He will visit other operating areas of Shell before leaving for Holland in January. During Wiringa's abscence he will be replaced by **E. R. Souermilch.**

**G. L. Glespen** has returned to American Cyanamid Co., New York, as assistant manager of the petroleum-chemicals department. For the past 10 months Glespen has served as chief of chemicals for the containers and

# Unchallenged champ of the oil fields!

**In the oil fields,** traditional International stamina really stands out.

Long after an International has paid for itself in actual use, it continues to deliver at peak efficiency—at absolute minimum operating and maintenance costs.

Yes—here in the toughest league of all, oil men have learned to depend on International. They know that comfort and handling ease go hand-in-glove with an International's longer life.

Get the proof of these facts—and more—from your International Dealer or Branch.

**INTERNATIONAL HARVESTER COMPANY • CHICAGO**

**Here's why Internationals lead the heavy-duty truck field!**

- Powerful, dependable, economical gasoline, diesel or LPG power plants for rough, tough going.
- The roomiest, most comfortable cab on the road—the Comfo-Vision Cab with one-piece Sweepsight windshield. Green-tinted, non-glare safety glass available.
- Super-steering system—more positive control. Wider front axles make possible full 37° turning angle for greater maneuverability.
- 115 basic models . . . everything from ½-ton pickups to 70,000 lb. GVW ratings.
- More than half the International Trucks ever built are still on the job.
- America's largest exclusive truck service organization.

*Better roads mean a better America*

International Harvester Builds McCormick Farm Equipment and Farmall Tractors...Motor Trucks...Industrial Power...Refrigerators and Freezers

SEE YOU AT THE FAIR

## INTERNATIONAL TRUCKS

"Standard of the Highway"

**International** L-210 series available in GVW ratings 30,000 to 34,000 lbs., 145, 157, 175, 193-in. wheelbases.

# Security CASING SCRAPER

- ***FIRST*** **to operate with rotary or vertical motion while going in or coming out of the hole**
- ***FIRST*** **to cut to exact inside diameter**
- ***FIRST*** **to positively clean every inch of casing**

*Cutters of Security Casing Scrapers have helical teeth for positive shearing action and are expanded to full inside diameter by spring pressure. Cutters contact entire casing circumference at all times.*

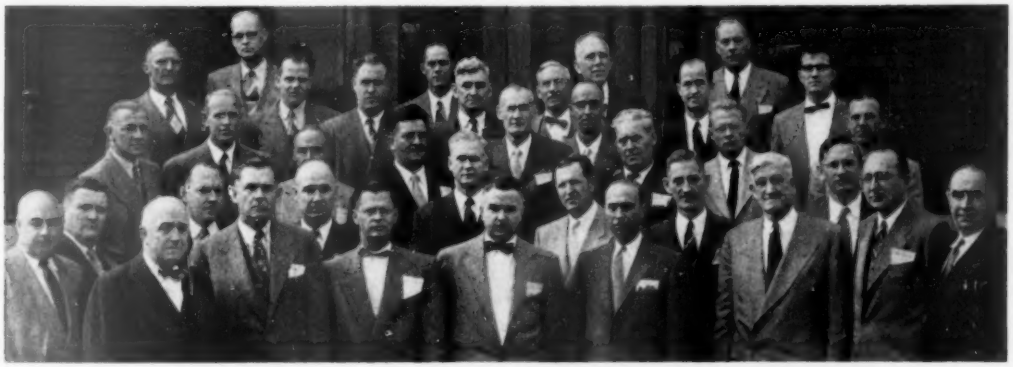
Security Casing Scrapers quickly and easily remove obstructions inside casing — such as scale, gun perforation burrs, or cement sheaths resulting from cementing operations.

Operators everywhere use the Security Casing Scraper as part of their well completion programs.

GET Security IN DRILLING

**SECURITY ENGINEERING DIVISION**
DRESSER OPERATIONS, INC.
Main Office and Plant: Whittier, California
Branches in all major producing areas
Export Office: Chanin Building, New York City

ROCK BITS • REAMERS • HOLE OPENERS • CASING SCRAPERS • SECURALOY



## Attend Refinery Symposium

**These men took part in a 4-day Sinclair Refining Co. maintenance and engineering symposium at the company's East Chicago refinery recently. First row, left to right, are: R. G. Arner, superintendent, East Chicago; T. D. Tifft, chief engineer; head office, New York; A. A. Fosha, Wood River, Ill.; J. True, East Chicago; W. R. Simpson, Wellsville, N. Y.; M. J. Neterer, East Chicago; W. S. Gullette, East Chicago; J. E. Bell, assistant chief engineer, New York; and W. R. Argyle, vice president for manufacturing, New York. Second row: J. Devine, East Chicago; E. W. Griscom, East Chicago; E. H. Hausner, Sinclair, Wyo.; W. W. Hitchcock, Houston; E. A. Sheetz, Marcus Hook, Pa.; N. Frick, Marcus Hook, and M. J. Wilcox, Wood River. Third row: E. B. Asmus, Sinclair; C. F. Mallory, Corpus Christi; H. D. West, Corpus Christi; W. Bennett, East Chicago; C. A. Faulconer, Richfield Oil Corp., Los Angeles; G. J. Vogel, East Chicago; A. H. Eron, Sinclair Development & Research, Harvey, Ill.; and A. Miller, East Chicago. Fourth row: W. T. Gootch, Houston; R. B. Thacker, Houston; G. R. Jameson, Wood River; A. R. Dyer, Richfield Oil Corp., Los Angeles; A. E. Shaw, Houston; E. R. Hoyle, East Chicago; R. B. Smith, Harvey; E. L. Greene, Wellsville; D. F. Cheaney, Houston; G. A. Blaine, East Chicago; G. O. Vasey, Sinclair; and N. Pennels, East Chicago.**

packaging branch of the materials division of the Petroleum Administration for Defense. He had been technical supervisor in the petroleum-chemicals department of American Cyanamid before taking a leave of absence to work with PAD.

**John Van Winkle,** West Point, Mont., has been appointed assistant field engineer for United Geophysical Co.

**Henry D. Noll** has been appointed director of engineering for Houdry Process Corp. Philadelphia. Other recent company appointments include: **A. Wesley Hoge,** manager of engineering; **Theodore A. Burtis,** supervisor of process engineering; **Josef W. Schall,** director of development, and **John B. Maerker,** section chief of development.

**H. E. Barton** has resigned as a geologist for Brinkerhoff Drilling Co. to join Emett Schieck & E. J. Boos, consulting firm in Casper, Wyo.

**W. B. Dansfield** has resigned as a geologist for Skelly Oil Co. in the Permian basin to become district geologist for Bankline Oil Co. there. He had been with Skelly 10 months and before that was with Gulf Oil Corp. about 5 years. He succeeds **William A. Adent,** who resigned.

**Charles Miller,** Kerr-McGee Oil Industries, Inc., has been elected chairman of the Rocky Mountain chapter of the American Association of Oilwell Drilling Contractors. Other officers are: **Dave True,** True & Brown, vice chairman; **Barney Oldham,** R. L. Manning Co., secretary; and **Douglas Brown,** True & Brown, treasurer.

**J. J. Havens,** production foreman for Shell Oil Co. at McCamey, Tex., has been transferred to Howard Glasscock field. Other company transfers include: **B. P. Walsh,** production foreman at Howard Glasscock field, to Monahans, Tex., and **E. D. Yetman,** junior mechanical engineer, from Midland, Tex., to New Orleans.

**Dr. W. E. Kuhn,** manager of technical and research division of The Texas Co., New York, has been elected chairman of the panel on fuels for air-breathing power plants, formed by the Research and Development Board, Department of Defense.

**F. B. Loomis, Jr.,** formerly area geologist for Shell Oil Co. at Calgary, Alta., has been transferred to Casper, Wyo., as senior geologist. Other recent transfers include: **S. M. Jones,** geologist, from Los Angeles to Tucson, Ariz.; **R. D. Hawkins,** geologist, from Long Beach to Ventura, Calif.; **R. E. Burns,** seismologist, from Circle to Billings, Mont.; **R. A. Hall,** seismologist, from Shafter to Fresno, Calif., and **W. M. Morford,** seismologist, from Sacramento to Bakersfield, Calif.

**Howard Wilson** has been promoted to assistant supervisor of refinery production in the refining department of The Texas Co., New York.

**A. B. Clarke,** formerly assistant technical manager of the manufacturing department of Standard Oil Co. (Ohio), has been named head of the newly created sales technical service unit.

**Bruce F. Grant** has resigned as section chief for the U. S. Bureau of Mines petroleum and natural-gas production branch at Franklin, Pa., to join Sinclair Laboratories, Inc., Tulsa, as a research engineer. He had been with the Bureau of Mines since 1942.

**D. H. Evans** has been appointed superintendent of the Turner Valley absorption plant for British American Oil Co., Ltd. He succeeds **Roy M. Donald,** who recently was appointed assistant manager of British American's Calgary, Alta., refinery. Evans, who joined the company in 1934, has served as an engineer at refineries at Moose Jaw, Montreal East, Calgary,

# Not Such A Tough Decision!

It wouldn't take one of our salesmen five minutes to make his choice in a case like this, and *the customer always wins.* We've built our business on service and we think it's a good idea. Yes sir! When it comes to getting your oil and gas supplies to you on time and delivered where you want them, we let nothing stand in our way.

**Our Stores and Offices are Located in:**

- **Shreveport, La.**
- **Baton Rouge, La.**
- **Lafayette, La.**
- **West Point, Miss.**
- **Yazoo City, Miss.**
- **Tinsley, Miss.**
- **Camden, Ark.**
- **Magnolia, Ark.**
- **Tulsa, Okla.**
- **Dallas, Texas**
- **Abilene, Texas**
- **Midland, Texas**
- **Houston, Texas**
- **Carthage, Texas**

**New York Office — Room 1212, 502 Park Avenue — Telephone El Dorado 5-3572**

**Chicago Representative — Telephone Midway 3-6172**

# SUPERIOR

IRON WORKS & SUPPLY COMPANY, INC.

1202-04 MARSHALL STREET • P. O. BOX 1800 • SHREVEPORT, LA.

# PERSONALS

Toronto, and Clarkson. He later was promoted to senior engineer in the head office manufacturing department in 1947, assistant construction superintendent at the Montreal East refinery, and metals inspector at the head office.

**Robert S. Stewart,** formerly in charge of the Near East area for Socony-Vacuum Oil Co., Inc., with headquarters in Cairo, Egypt, visited friends in Tulsa last week. Since his retirement last year Stewart has been on a world tour.

**J. J. Moon** has been promoted to engineer for United Gas Corp. at the Edna compressor station in Houston. He began as an employe at Shreveport.

**J. W. McCutchen,** an assistant engineer in the New Orleans and San Antonio districts for United Gas Corp., has been transferred to the Shreveport general office research department.

**Dr. S. A. Ballard** has been named head of the petroleum-refining department at the Shell Development Co. laboratories at Emeryville, Calif. Prior to serving a year at the Amsterdam laboratory and The Hague office of Royal-Dutch Shell, he was head of the organic synthesis department at Emeryville. He succeeds **Dr. B. S. Greenfelder,** who will devote more time to his principal duties as associate director of research.

**C. J. (Dutch) Jensen** has been named president of Carl B. King Drilling Co. of Texas at Midland, succeeding the late Bruno R. Schabarum. Other officers elected include: **R. C. Schmidt,** vice president in charge of contracts; **J. D. Fogerson,** vice president and general superintendent, and **H. D. Johnson,** secretary and treasurer.

**Wallace R. Finney,** who retired recently as pipe-line adviser to Standard Oil Co. (N. J.), was honored by fellow oil men at a luncheon in New York for his contribution to the industry. Finney joined Jersey in 1932 and had been pipe-line adviser since 1944. He assisted in planning for Trans-Arabian and other Middle East pipe lines and during World War II headed the industry committee which supervised the design and construction of the Big and Little Inch emergency pipe lines.

**J. O. Munnerlyn,** first engineer in the Houston district for United Gas Corp., has been transferred to the Shreveport district at Latex compressor station.

**D. S. M. Langworthy,** in charge of the London, England, offices of the Gulf interests and a director of Kuwait Oil Co., Ltd., was in Tulsa last week. He formerly was connected with the Mid-Continent executive department of Gulf Oil Corp.

**R. O. Turner,** vice president of Southern California Petroleum Corp. and manager of its Camay Drilling Co. division, has been elected a director of the corporation. Turner fills the vacancy on the board caused by the resignation of **H. C. Christie,** who will devote his full time to activities as an independent operator and to personal affairs.

**W. B. Hayes,** formerly drilling superintendent of International Petroleum Co. in Peru and Colombia, has accepted a similar position with Dunlap & Graham Drilling Co., Inc. He is now in charge of the company's drilling operations in Colombia.

**Kenneth E. Hill** has been promoted to vice president of the petroleum department of Chase National Bank, New York. A native of Oakland, Calif., he joined Chase as a petroleum engineer in 1946. Prior to that he spent 2 years with The Texas Co. and 2 years with the State of California Oil Proration Authority.

**A. W. Scott,** newly elected president of the National Petroleum Association, and president of Wolf's Head Oil Refining Co., Inc., Oil City, Pa., has been appointed to membership on the National Petroleum Council. He succeeds **Earle M. Craig,** retiring association president.

# DEATHS

**E. A. Stiller,** 54, Shreveport independent geologist, died there October 7. He formerly was chief geologist for Arkansas-Louisiana Natural Gas Co. A native of Kansas, he had lived in Shreveport 25 years.

**Louis M. Holliday,** machinist-foreman for Magnolia Petroleum Co., died recently in Sundown, Tex.

**Henry J. Harris,** 72, Long Beach, retired engineer for Shell Oil Co., died recently.

**D. M. Phillips,** 82, an oil producer who operated in Pennsylvania, Illinois, and northern Indiana fields, died at his home in Sullivan, Ind., October 6. He was a pioneer of the water-repressuring method of secondary oil production.

**Clark Hughes Eaton,** a scout for Roxana Petroleum Co. at Tulsa and Houston from 1915 to 1922, died in a Harrisburg, Pa., hospital October 10.

**Walter T. Crandall,** 52, former division superintendent of production for Sinclair Oil & Gas Co., died October 15 in a Fort Worth hospital.

**Gaddis Bass,** 59, head of the mineral-development department of the Texas Land Office from 1932 to 1942 and a former official of Delhi Oil Corp., died recently in Marlin, Tex.

**I. C. Barry,** 74, former construction foreman in Kilgore, Tex., for Magnolia Petroleum Co., died recently in Longview, Tex.

**Donald Adair Powell,** 62, vice president and director of Drilling & Exploration Co., Inc., in charge of the Panhandle, West, Texas, and New Mexico operations since 1936, died October 12 in a Hobbs, N. M., hospital.

**Cleo Hyde,** refrigeration unit operator at the Mid-Continent Petroleum Corp. refinery at Tulsa, died October 13. He had worked in the refinery 15 years.

**H. A. Mason,** assistant to the manager of laboratories for General Petroleum Corp., Los Angeles, died October 7. He joined General Petroleum as a chemist in 1917 following his graduation from the University of California. He had been on leave since last January because of ill health.

# Spraberry Spacing Report . . .

. . . Here are important data from the recent Texas Railroad Commission hearing on the Spraberry trend well-spacing problem. This expert testimony showed:

1. Well spacing of 40 acres is uneconomical.

2. Wider spacings, which are economical, can be used without loss of recovery.

3. Recovery efficiency is independent of oil rate.

**by Roy F. Carlson**
West Texas District Editor

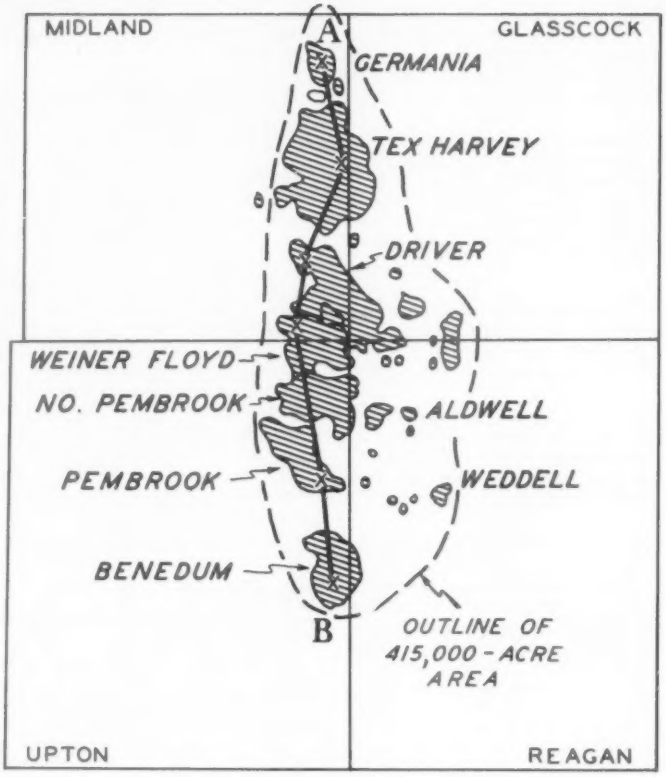



Fig. 1—Place-fix map of Spraberry trend.

WELLS drilled in the Spraberry trend of West Texas will obtain recoveries of 400 to 800 bbl. of oil per acre, depending upon how much of the Spraberry net pay section is opened into the well bore.

This recovery, uneconomical on 40-acre spacing, can be obtained from much larger areas than 40 acres—areas large enough for a well to pay off.

These were the major conclusions drawn by several engineers* from testimony before the Texas Railroad Commission at a recent hearing to consider wider spacing. Highlights of the testimony leading to those conclusions follow. All testimony and conclusions are taken from those of testifying engineers.

*Engineering testimony was presented for operators by J. A. Rauhut and W. P. Z. German, Jr., attorneys from Austin and Midland, Tex., respectively, and W. O. Keller, Midland consulting engineer, and L. F. Elkins, Sohio Petroleum Co., reservoir engineer. It was directed at proving that wells would drain an area of 80 acres or more.

**Drilling decline . . .** First part of the testimony showed a rapid decline in drilling in the trend area, an area in Midland, Glasscock, Upton, and Reagan counties including 415,000 acres, which was considered in presentation of all evidence. At the high point of drilling activity, 235 rigs were busy in the trend, whereas by the first of September only about 60 were working in widely scattered areas. The 415,000-acre area under consideration was considered to be a minimum estimate of the area of the trend proven productive in the four counties, of which 70 per cent is as yet undrilled. Areas under consideration are shown in Fig. 1.

Current oil production was shown to be considerably under the allowable production rate of 121 bbl. per day and cumulative production from the fields in the area was shown to lag behind the allowable cumulative by a large amount in spite of a constant addition of new wells to contribute to such cumulative in recent months.

Continuity and similarity of the Spraberry section from point to point along the trend was demonstrated by records from electric logs in widely separated wells.

### Core Data

A sample log taken from one of the Spraberry wells illustrates the low measure of permeability, porosity, and oil saturation found in the Spraberry rock with a corresponding high degree of water saturation in per cent of pore space. Pay and nonpay zones of the Spraberry are difficult to distinguish according to most common measurements because of the extremely low values of porosity and permeability in

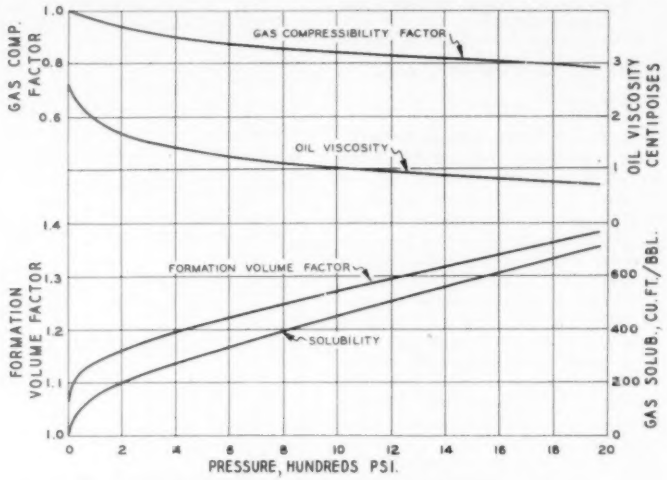



Fig. 2a—Reservoir conditions for Driver field.

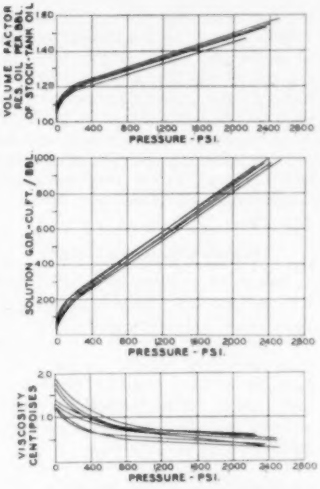



Fig. 2b—Data for lower section

the matrix rock. Porosity in the sandstone, as identified by geologists, varies from 2.4 to 8 per cent with permeability varying from 0.001 to 0.8 md. The shale exhibits a porosity of 0.2 to 10.7 per cent and a permeability range from less than 0.001 to 0.15 md.

Cores from nearly all parts of the Spraberry produce oil in the usual retorting method of core analysis. To differentiate between the pay and nonpay sections, samples were heated to 400° F. under a high vacuum. The sections identified as shale would not distill off any oil while the sandstone sections would.

As a result of these studies, the pay sections were taken to be those members identified as standstone or siltstone and which has less than 60 per cent water saturation. In one of the Spraberry areas this averaged a gross sandstone section of 31 ft. in the main upper Spraberry section and 27 ft. in the lower Spraberry with net pay sections of 16 and 15 ft. respectively. Average porosity of the net pay in this well was determined to be 9.9 per cent; and water saturation 30 per cent in the upper Spraberry. The lower Spraberry has an average porosity of 10.0 per cent, and an average water saturation of 16.5 per cent in this area. Water saturation was determined by the mercury-injection method.

Another set of averages of this kind of core data is given in Table 1. These data are determined by several different kinds of measurement techniques, however. This evidence was presented to show the tightness of the Spraberry

TABLE 1

**Comparison of Core Data, All Fields, Spraberry Trend—Midland, Glasscock, Upton, and Reagan Counties**

| | Water sat. (per cent) | | Permeability (md.) | | Porosity (per cent) | |
|---|---|---|---|---|---|---|
| Field— | No. wells | Avg. | No. wells | Avg. | No. wells | Avg. |
| Tex-Harvey | 6 | 56 | 7 | .18 | 7 | 8.3 |
| Germania | 4 | 65 | 5 | .53 | 5 | 8.9 |
| Weiner-Floyd | 6 | 66 | 7 | .27 | 7 | 8.0 |
| Pembrook | 2 | 46 | 3 | .74 | 3 | 2.3 |
| N. Pembrook | 3 | 42 | 4 | .15 | 4 | 7.8 |
| Aldwell | 3 | 66 | 3 | .18 | 3 | 10.6 |
| Driver | 9 | 55 | 27 | .26 | 29 | 7.9 |
| Benedum | 8 | 44 | 8 | .35 | 8 | 10.1 |
| Trend area, average | 41 | 55 | 64 | .29 | 66 | 8.4 |
| Total samples | 3,375 | | 4,588 | | 5,375 | |

pay, and to help illustrate the importance of fractures in Spraberry oil production.

In an effort to establish the volume of the fracture system in the Spraberry sand, diameter measurements were made parallel and perpendicular to fractures in cores. A total of 2,058 ft. of cores were used from which 111 samples were taken. Cores were cut from five wells. The maximum fracture opening was found to be 0.013 in. with an average of 0.002 in. There were an average of 412 ft. cored per well, with 132 ft. unfractured. An average of 253 ft. per well was fractured with an average of 16 ft. of multiple fracturing noted. The per cent of total section fractured was 66 with 4 per cent fractured multiple.

Using an average core of 3½ in. and the fracture occurrence shown above to calculate an average fracture occurrence in the Spraberry, one parallel set would have fractures spaced at 5 in., or a set of perpendicular fractures would be spaced 10 in. apart throughout the sand.

Analysis of reservoir oil and pressures at a depth of —4,400 ft. from 10 wells in Driver field, Glasscock County, gave the following results for the upper Spraberry sand:

| | |
|---|---|
| Average reservoir temp., °F. | 136 |
| Saturation pressure, psi. | 1,981 |
| Formation volume factor | 1.385 |
| Gas sol., cu. ft. per bbl. at saturation pressure | 713 |
| Oil viscosity at saturation pressure, cp. | 0.71 |
| Compressibility of oil, vol./vol./psi. ($\times 10^{-6}$) | 12.2 |
| Gravity of residual oil, °A.P.I. | 37.2 |

A chart of these factors is shown in Fig. 2a.

Reservoir volume calculations for the main upper Spraberry are as follows:

| | |
|---|---|
| Gross sand, ft. × porosity × (1 — $C_wW_a$) (ft.) | 1.28 |
| Formation volume factor, vol./vol. | 1.385 |
| Oil content, matrix, 1.28 × 7,758 ÷ 1.385 (bbl. tank oil/acre) | 7,170 |
| Net sand, ft. × porosity × (1 — $C_wW_a$) (ft.) | 1.11 |
| Oil content, matrix, 1.11 × 7,758 ÷ 1.385 (bbl. tank oil/acre) | 6,220 |
| Fracture void vol., (0.002 in. opening 5-in. spacing, 35-ft. section), 0.002 ÷ 5 × 35 × 7,758 (bbl./acre) | 110 |
| Oil content, fractures, 110 ÷ 1.385 (bbl. tank oil/acre) | 80 |
| Total oil (gross pay plus fractures) (bbl. tank oil/acre) | 7,250 |
| Total oil (net pay plus fractures) (bbl. tank oil/acre) | 6,300 |

Calculations for the lower Spraberry section, using a 27-ft. section and an

average formation-volume factor of 1.580, gave a total gross oil content of 6,150 bbl. tank oil per acre, and the net oil was found to be 5,900 bbl. tank oil per acre. The sand section used was that determined by geologists to be sandstone and siltstone, and the net sand was that portion of this that has less than 60 per cent irreducible water saturation. Data are shown in Fig. 2b.

### Sohio's Driver Area Study

Results of a widespread interference test conducted by Sohio Petroleum Co. were again presented to the commission to demonstrate the widespread communication between wells. Similarity in pressure behavior in wells at least a half a mile from the test well showed that effective communication between wells is present.

This is further illustrated by observing pressures in newly completed wells that were completed later than other wells that had been producing continuously. In all instances the new wells exhibited lower bottom-hole pressures than the estimated original bottom-hole pressure in the area, and in most cases the new wells exhibited a pressure equal to that existing at the same time in the older surrounding wells except for a minor pressure gradient difference. This behavior was followed by 66 wells in Driver field, with exception.

In order to show that areas between the wells were not isolated and were contributing their share of oil to the wells a series of pressure drawdown calculations were made for this group of wells. If calculated results matched observed pressures it would be assumed that there were no large unfractured blocks in the interwell areas as could be possible if through some coincidence the fracture system connected just the wells.

The formula used for this set of theoretical determinations was as follows for several wells:

$$P_o - P = \frac{UB}{4\pi\ 1.127\ KH} \times \Sigma Q E_i \left[ \frac{R^2}{4\,(K/UCF)\,6.32\,T} \right]$$

where:

$P_o$ = initial pressure, psi.
$P$ = pressure at distance R at time T, psi.
$Q$ = constant production rate, B.O.P.D.
$U$ = oil viscosity, cp.
$B$ = formation volume factor
$K$ = effective permeability, darcies
$H$ = thickness, ft.
$R$ = distance, ft.
$C$ = weighted average compressibility of oil, connate water and rock matrix, vol./vol./psi.
$E_i$ = exponential integral (tabulated mathematical function)
1.127 = conversion factor (darcy to bbl., ft., psi., day)
6.32 = conversion factor (darcy to ft.$^3$, ft., psi., day)
$F$ = porosity fraction

These calculations were made for 55 wells in the Driver area and the effects of all wells within 3 miles of one another—a total of from 50,000 to 60,000 separate computations. In making the calculations to match measured pressure drawdown it was necessary to choose values of the diffusivity factor, K/UCF, for insertion in the formula. Value was taken from within a range of values in which it was assumed to lie as a result of measurement of productivity index, core data, and other quantities. Since one of these chosen values fit observed pressures very closely it was concluded that the factors used in the formula must also be in close agreement with measured or actually observed values.

Results of one of the sets of these calculations showed that 60 per cent of the calculated pressure points were within 30 psi.—or range of instrument error—of actual measured values. Therefore, since the pressure points fitted closely, it was concluded that the value of diffusivity factor that gave

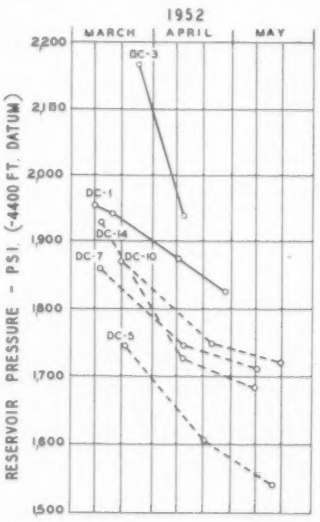



Fig. 3—Shut-in well pressure decline.

that result was also correct. And if the diffusivity factor was correct, the measured values of permeability; porosity; compressibility of oil, water, and rock; porosity fraction, and other values were of a representative order of magnitude and reflected correct values for the Spraberry trend. This close agreement between calculated and measured rock and fluid expansibility indicated that all the reservoir surrounding any given well was contributing to production and that there were no appreciable unaffected areas in the reservoir.

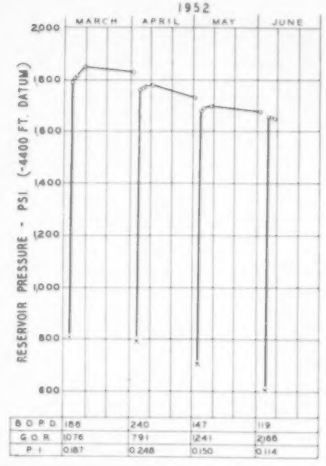



Fig. 4a—Pressure decline for well open only during test.

The calculations also indicated that figures for pay thickness, oil and water content, oil viscosity, etc., were also correct. Calculated and measured pressures were all above the bubble point so that only liquid behavior was taken into account.

### Interference Test

Some reference has already been made to the Sohio interference test conducted in Driver field of the Spraberry trend. Results of this test have also been discussed in previously published material. (See *The Oil and Gas Journal, August 11, 1952.*).

Briefly, alternate staggered wells in several contiguous sections were shut in with their allowables assigned to other wells on the same lease which produced regularly except for 72-hour shut-in periods for pressure and other measurements.

Rapid consistent drops in pressure were noted in the shut-in wells almost paralleling the drops in pressure noted in the producing wells, but usually lagging a little behind them. The producing wells lost pressure on the order of 200 psi. in 2 months. Shut-in wells declined at the same rate, as illustrated by Fig. 3, for one of the leases in the test area.

Fig. 5 shows the pressure behavior

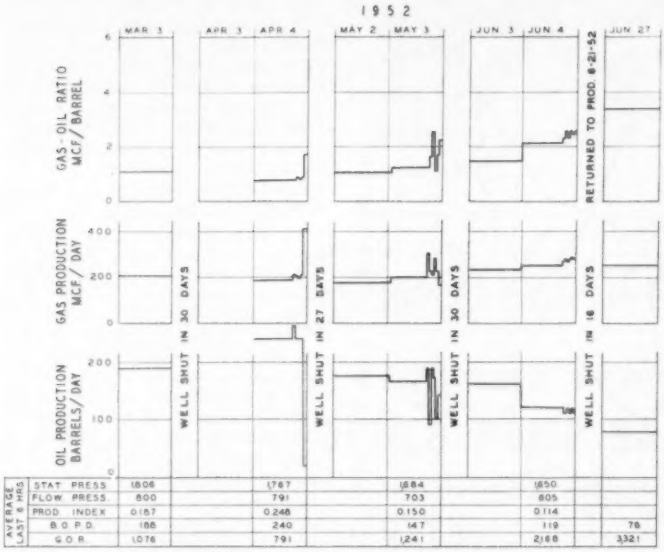



Fig. 4b—Detailed production account for well in Fig. 4a.

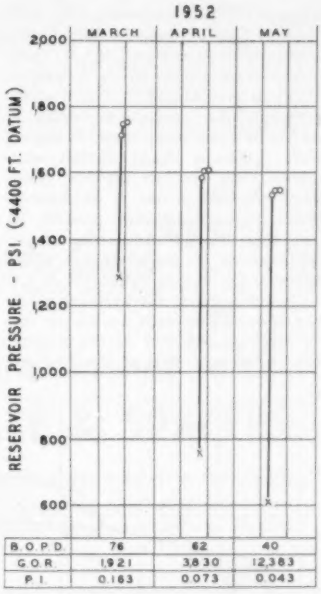



Fig. 5—Pressure decline for producing well.

of one of the shut-in wells on the same lease as above which was opened monthly for a 48-hour test of producing ability. The chart in Fig. 4a shows the decline in pressure even though the well was not producing oil except for the period of the test which amounted to less than 3 per cent of the lease production.

Fig. 4b gives a detailed account of oil and gas production from this well. Only the last three of the test results of gas-oil ratio and productivity index can be considered comparable in the first of the measurements was made at the end of a long period of continuous production and the other three were made during the last 6 hours of a 48-hour test period. In the comparable tests it will be noted that a steady decline in productivity index is shown by the wells along with a rapid rise in gas-oil ratio, illustrating that a point in the reservoir 1,320 ft. away from the producing well is affected by that well's production.

Fig. 5 shows the results measured on one of the regularly producing wells which was tested monthly for the 3-month duration of the test. As illustrated, pressures dropped rapidly for each month of the 3-month period, with an accompanying rapid decline in productivity index and a climb in gas-oil ratio, all of which factors are indicators of depletion of the recoverable oil in the reservoir.

The object of the interference test was to compare drainage and recovery efficiency of close and distant wells to regularly producing wells. As shown by the pressure tests, there is sufficient

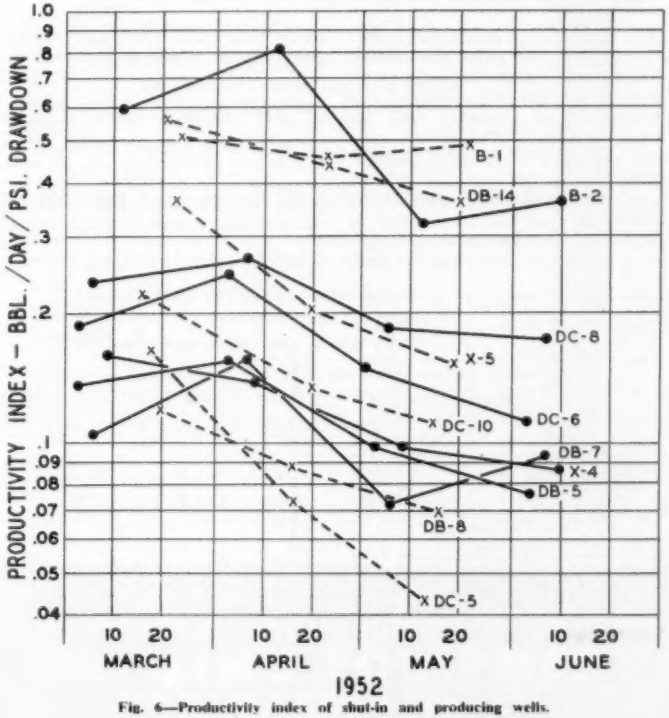



Fig. 6—Productivity index of shut-in and producing wells.

drainage of fluid so that there is little pressure time lag between shut in and producing wells at least 1,320 ft. apart.

Results of another of the indexes of depletion are charted in Fig. 6 which compares the productivity index of shut-in and producing wells. Producing wells exhibit a steady decline while shut-in wells are less uniform, sometimes showing a rise in productivity index. This latter feature probably results from lack of stabilization of production rate in the short test period afforded the shut-in wells.

On an average, the productivity index of producing wells was 66 per cent as much at the end of the 3-month test period as it was in the first test.

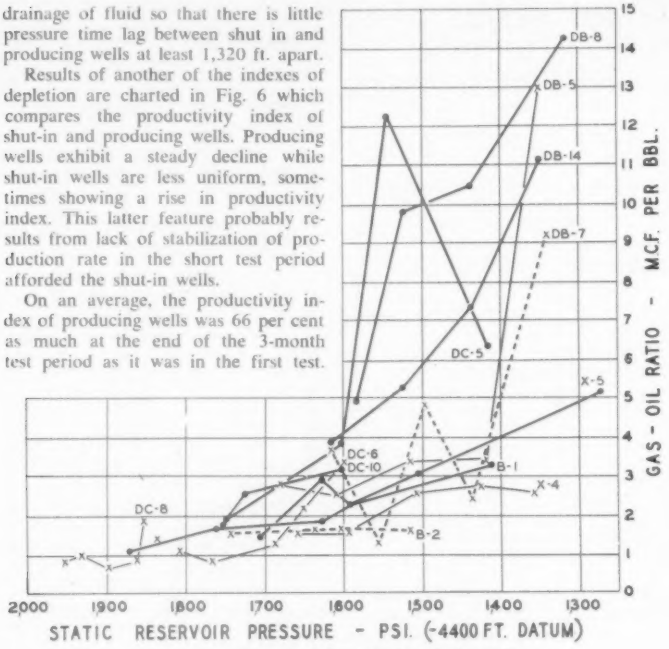



Fig. 7—Gas-oil ratio of shut-in and producing wells.

This reduction in productivity index was almost equaled in the shut-in wells.

Gas-oil ratio is also an index of depletion and results of a number of tests of shut-in and producing wells are shown in Fig. 7. The gas-oil ratios were compared at the same pressures rather than on the same date in order to give more comparable results. Again stabilization had not taken place in some of the tests of shut-in wells, giving erratic results. However, the chart shows substantial agreement between producing wells and shut-in wells at least 1,320 ft. away.

The increase in gas-oil ratio in shut-in wells paralleling that in regularly producing wells indicates further reduction in oil saturation in the oil sand at points at least 1,320 ft. from the producing wells. Also a rapid rise in gas-oil ratio with pressure decline is shown.

A plot of gas-oil ratio and reservoir pressure against per cent recovery of oil in place originally for Driver field is shown in Fig. 8. Extrapolation of the reservoir pressure curve shows a recovery of oil just over 7.5 per cent of oil in place at a reservoir pressure of 200 psi. The gas-oil ratio at a corresponding point would be at a rate of 110,000 cu. ft. per barrel.

On May 20 the average pressure at the pay level was 1,512 psi. in the Spraberry sand. This pressure would indicate a recovery of 5.72 per cent of the initial oil in place, or 360 bbl. per acre of the net section, or 415 bbl. per acre for the gross section. Actual recovery on that date was measured at 418 bbl. per acre on 40-acre well. The actual area from which oil was taken by these tests wells is in doubt because they may have been draining oil from a larger area.

Conclusions drawn from the results of this interference data indicate that the rate of drainage, recovery, and other relationships exhibited by Fig. 9a and previous illustrations are representative of the average Spraberry well. They indicate that most of the recovery has been obtained at 1,000-psi. reservoir pressure when 7.2 per cent of the oil in the effective part of the reservoir has been recovered. The chart is applicable only to the upper Spraberry but would apply similarly to the lower Spraberry. Only 0.2 per cent additional recovery would be achieved for a 400-psi. drop below 1,000 psi.

### Capillary Effects

Because the Spraberry has permeability of such a low order and because

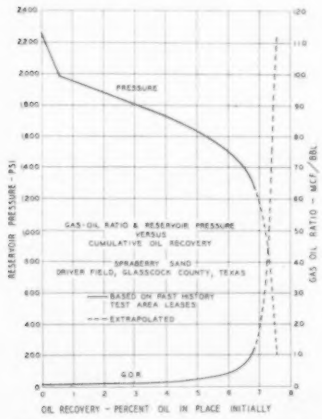



Fig. 8—Oil recovery from Driver field.

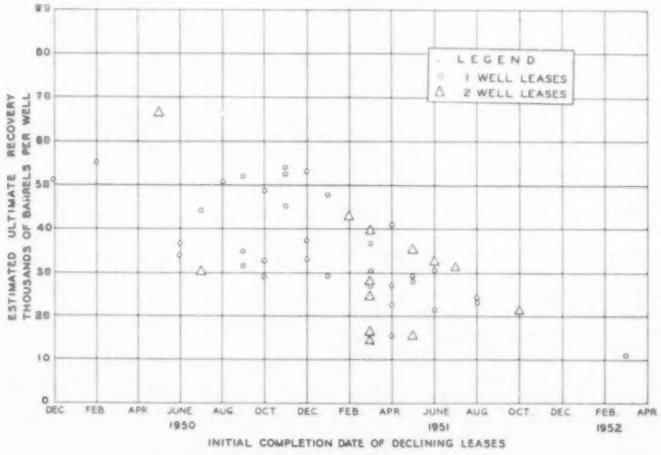
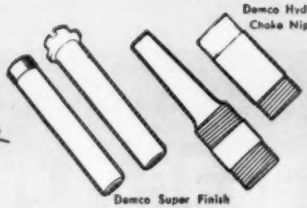



Fig. 9a—Ultimate recovery data for upper Spraberry.

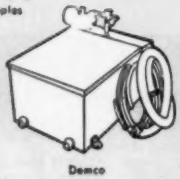
Demco Auto-Flo Mud Hopper

Demco Standpipe Clamps



Demco Super Finish Wash Pipes

Demco Hydraulic Choke Nipples

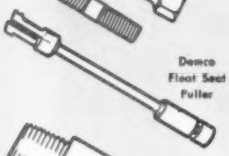


Demco Rod Oiler

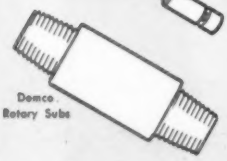
Demco Hydraulic Hose Adapters

Demco Hose Hobbles

Demco Alloy Steel Pump Studs



Demco Float Seat Puller

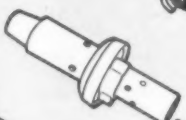


Demco Rotary Subs

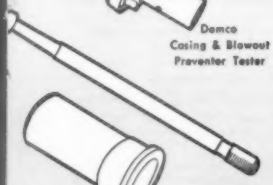
Demco Gland Bushings and Junk Rings

nco "No Chip" Tong Dies

emco Pump Brace and Spacers



Demco Casing & Blowout Preventer Tester



Demco Bronze Rods and Liners

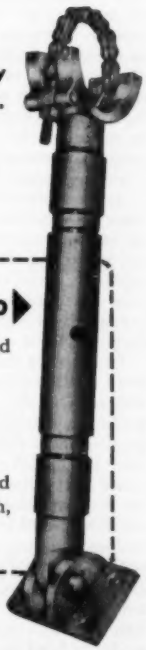
# *Brace Up-Pardner*

## You'll save time and money with

# DEMCO PUMP BRACE & SPACERS

Remember, no matter how heavy that slush pump is, it needs to be anchored for greatest efficiency. For example, here are some of the things you accomplish when you use Demco Pump Brace & Spacers:

- ★ **Keep pump from shifting!**
- ★ **Prolong life of expensive drive belts by maintaining proper alignment and tension.**
- ★ **The 9-inch adjustment spread makes it possible to pull pump forward so belt can be removed over sheaves when tearing down or moving.**



**MADE AND ASSEMBLED TO MEET EVERY NEED**

Demco Pump & Spacers are available in Standard and Heavy Duty Sizes in three different combinations:

- **#1—Yoke on both ends (not shown here)**
- **#2—Plate and yoke combination (at right)**
- **#3—With plate on both ends (not shown)**

If additional length is required in the field, simply add extra heavy nipple and coupling for the desired length, and thus save time and welding expense!

***Always Go Demco — It Pays!***

DRILLING EQUIPMENT MFG. CO. DEMCO OKLAHOMA CITY, OKLA. U.S.A.

*DEMCO PRODUCTS ARE AVAILABLE AT YOUR LOCAL SUPPLY STORE*

## DRILLING EQUIPMENT MANUFACTURING CO.

General Office & Plant — Oklahoma City, Okla. — P.O. Box 4728 - Phone ME 2-4475
Export Office: 233 Broadway, New York, N. Y.

TABLE 2—AVERAGE ESTIMATED FLOW CAPACITIES OF FRACTURES BY FIELDS

| Field— | Productivity index: Calculated from cores analysis | Productivity index: Measured from test data | Productivity index: Per cent due to fractures | Initial potential: Calc. from core analysis (b.o.p.d.) | Initial potential: Measured from test data | Initial potential: Per cent production due to fractures |
|---|---|---|---|---|---|---|
| Tex Harvey | .027 | .46 | 94 | 36 | 432 | 92 |
| Driver | .009 | .72 | 99 | 10 | 412 | 98 |
| Weiner-Floyd | .005 | .41 | 99 | 5 | 645 | 99 |
| Benedum | .024 | .27 | 91 | 52 | 519 | 90 |
| Germania | | | | 51 | 426 | 87 |
| North Pembrook | | | | 5 | 140 | 97 |
| Pembrook | | | | 41 | 253 | 84 |
| Average | .018 | .55 | 97 | 30 | 410 | 93 |

TABLE 3—INITIAL POTENTIAL DISTRIBUTION IN SPRABERRY TREND

| Field— | No. of wells | Per cent of wells in potential range shown below in barrels: 0-50 | 50-100 | 100-200 | 200-300 | 300-400 | 400-500 | >500 |
|---|---|---|---|---|---|---|---|---|
| Tex Harvey | 50 | 2 | 4 | 26 | 25 | 19 | 11 | 13 |
| Driver | 353 | 1 | 4 | 19 | 10 | 22 | 13 | 25 |
| Aldwell | 52 | 4 | 23 | 34 | 8 | 6 | 19 | 6 |
| Benedum | 102 | 2 | 9 | 25 | 20 | 8 | 9 | 27 |
| Germania | 80 | 4 | 8 | 22 | 21 | 26 | 9 | 10 |
| N. Pembrook | 195 | 4 | 8 | 24 | 22 | 17 | 15 | 10 |
| Weiner-Floyd | 132 | 0 | 2 | 28 | 24 | 12 | 15 | 21 |
| Pembrook | 70 | 4 | 14 | 39 | 19 | 11 | 7 | 6 |

the formation has rather thorough fracturing, its behavior is considerably different from other sandstone reservoirs. In most normal sandstone reservoirs, capillary retention of oil in the matrix rock plays a rather small part in recovery of oil. However, in the Spraberry sand, with such low permeability, the capillary pressure differences are on the same order of magnitude as the pressure gradient from the center of a fracture block to the fracture face.

At low rates of production of oil from a gas-saturated-oil-filled core, less oil will be produced than at high rates due to exertion of greater effect by the capillary attraction for oil. At high rates of pressure decline rapid gas movement through the rock matrix will drag oil with it.

To illustrate this effect in the Spraberry sandstone, an experiment was run with some of the best of the Spraberry sandstone, a section having 8 per cent porosity and 1.1-md. permeability. This core was machined to closely fit a closed steel cylinder, and the core, after cleaning, was inserted into the cylinder which was then closed. Water was introduced to simulate a 28.5 per cent water saturation, and remaining voids in the core were filled with gas-saturated Spraberry oil. The cylinder was then opened to permit oil and gas to be produced from the core. Two different production rates were used with the recoveries shown as follows:

TEST 1

| | |
|---|---|
| Simulated connate water saturation, per cent | 28.5 |
| Saturation pressure of crude, psi. | 2,000 |
| Average rate of pressure drawdown, psi./min. | 200 |
| Residual oil saturation by weight difference, per cent | 26 |
| Calc. oil recovery, per cent of original oil in place | 52 |

TEST 2

| | |
|---|---|
| Simulated connate water, per cent | 13.4 |
| Saturation pressure of crude, psi. | 1,990 |
| Average rate of pressure drawdown, psi./day | 100 |
| Residual oil saturation by weight difference, per cent | 57.5 |
| Calc. oil recovery, per cent of oil in place initially | 7 |

No oil recovered after about 1,000 psi. pressure was reached, with only gas coming out of cores in Test 2.

Since the average rate of pressure drawdown in the field is even less than that used in Test 2—103 psi. per day—it is presumed that results of that test are indicative of recoveries under field conditions.

### Oil Flow System

The Spraberry oil flow pattern must consist of flow of oil and gas out of the matrix rock into fractures through which the oil is conducted to the well bore. The flow of oil from the matrix rock into the fractures represents a flow mechanism comparable to that which is observed in relatively short core segments.

In the flow in these short cores, capillary pressures materially influence flow mechanism and the amounts of oil recoverable because of so-called end, or boundry, or fluid pileup effects at the core face where there is a capillary discontinuity. These are only considered effective over very short distances but are effective in the Spraberry sand which is divided into rela-

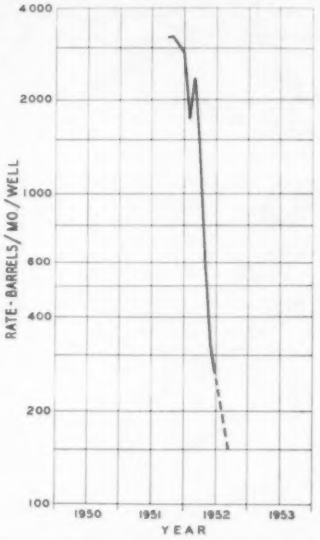



Fig. 9b—Ultimate recovery as function of completion date.

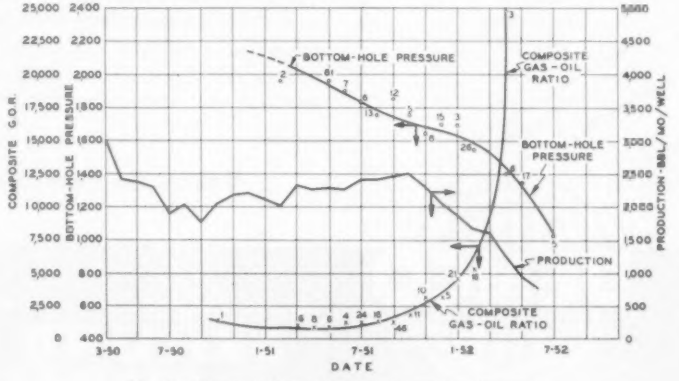



Fig. 10a—Reservoir history for one of trend's major areas.

# SUPPLYING WEST TEXAS AND NEW MEXICO

- MIDLAND
- ABILENE
- EUNICE
- FARMINGTON
- BROWNFIELD
- HOBBS
- KERMIT
- ODESSA
- SNYDER
- SUNDOWN

In West Texas and New Mexico, Mid-Continent Supply Company has consistently expanded its stores and services to assure a readily available source of the finest in equipment and supplies to meet any oil-field requirement. You'll find these Mid-Continent stores operating "Around-the-Clock" . . . and staffed by experienced men who have the "know-how" to give you unexcelled specialized service. Make these stores, topped by the familiar blue neon oil-spouting derrick, your supply headquarters.

**MID-CONTINENT Supply Company**

*General Offices Mid-Continent Bldg.* FORT WORTH, TEXAS

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

— AND FASTER WITH

**RADIO**

Mobile Two-Way Radio Guarantees Our Advanced Service Facilities

**WHERE ELSE CAN YOU MATCH THIS KIND OF SERVICE?**

In many areas-

# a key to GREATER PROFITS!

## AMERICAN IRON

# *Flash Welded*

## TOOL JOINTS

In many areas — a flash welded, unitized drill string provides advantages that make for greater profits! In these areas, you'll find that American Iron "Flash Welded" Tool Joints provide the key to the most effective, economical performance from this type drill string!

Three important factors make American Iron "Flash Welded" Tool Joints outstandingly dependable. They're DESIGNED RIGHT . . . MADE RIGHT . . . and INSTALLED RIGHT, with gigantic controlled surges of electricity welding tool joints to drill pipe — forming integral units!

*Manufacturers of A.P.I., "Straight Grip," "Amweld," and Tubing Tool Joints*

AMERICAN IRON & MACHINE WORKS CO.
MANUFACTURERS OF A OIL FIELD EQUIPMENT
OKLAHOMA CITY U.S.A.
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

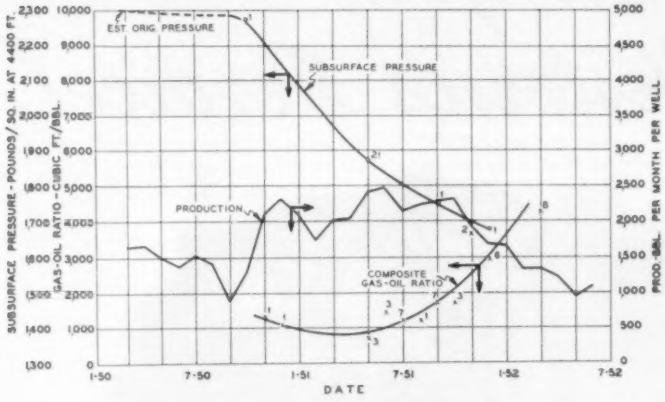



**Fig. 10b—Reservoir history for another of trend's major areas.**

tively small blocks by the fracture system.

Differences in the capillary pressure values in gas and oil in the matrix rock make many times the pressure available to move gas through the rock than to move the oil. This results in the high rate of increase in gas-oil ratio and rapid decline in oil productivity. Ultimately in a sand block of this kind a point is reached in the pressure distribution so that no oil will flow and that pressure in the rock will be bled off through gas production. This point is reached when there is a continuous gas phase in the rock segment.

The relationship between capillary pressure of oil and gas is such that a saturation could be reached where gas would be produced from the matrix rock while the rock was absorbing oil. This is the basic principle behind the water imbibition process that is slated for trial in the Spraberry trend. The water is absorbed with accompanying discharge of oil in this instances because the water has a higher capillary pressure than the oil.

As a result of the capillary characteristics of the matrix rock operators do not have any control over recovery efficiency in the trend area. The capillary pressure, as previously mentioned, require that production rate be extremely high, far greater than field production rates, to effect any increase in recovery. Behavior of oil and gas in the matrix rock is unaffected by distance from the well bore, except as that distance affects fracture pressure. The fractures contribute little to storage of oil but nearly everything to flow capacity of a well, while the matrix contribute nearly all of storage but little of flow capacity.

Another illustration of ultimate recovery is available from those wells on leases that have had enough production history to establish a decline trend. A plot of the ultimate recovery versus completion date is shown in Fig. 9b to illustrate how ultimate recovery from a well is reduced in the newer wells, confirming other data that demands continuity of fracture system. The decline trends were plotted for one and two-well leases in Tex Harvey field on semilogarithmic paper as shown in Fig. 9b. Some of the wells investigated declined to 4 bbl. per day in 1½ years from completion date.

Figs. 10a, 10b, and 10c, present composite reservoir histories for three of the major areas in the trend. Sharp drops in pressure and production are noted with the passage of time and are accompanied by an extremely rapid rise in gas-oil ratio. Ratios as high as 25,000 cu. ft. per barrel were common 2 or 3 months ago, and recent ones of 100,000 cu. ft. per barrel and over have been measured.

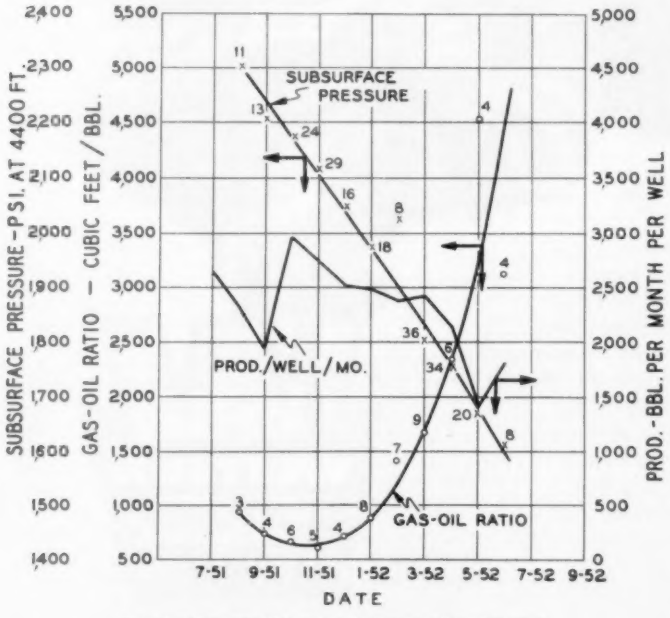



**Fig. 10c—Reservoir history for third of trend's major areas.**

### Summary

Data as presented at the hearing indicates that . . .

- Well spacing may be as much as 160 acres without reducing the ultimate recovery of oil from a pool in the Spraberry trend.
- There will not be measurable differences in recovery per acre on spacing up to 160 acres per well. (The dimensions of a square 160-acre area are 2,640 ft. on a side, and 1,320 ft. from the center of the area to the center of one side.)
- Rate of recovery will also have little effect upon recovery efficiency.
- Per acre recoveries will be between 400 and 800 bbl. per acre depending on how much of the Spraberry net pay section is opened to the well bore.

# "Let Me Tell You About Western's Service!"

"I'm one of the engineers for a Western Well Service unit. I've treated hundreds of wells. The way Western goes about treating wells from an engineering standpoint, and the modern specially designed equipment Western uses for each job certainly has sold me on Western. If you'll take the trouble to check, you, too, will find that Western does an outstanding job!"

WESTERN
Engineered
WELL SERVICES

General Offices
Midland, Texas

ACIDIZING • JET & BULLET PERFORATING • RADIOACTIVITY WELL LOGGING • BRIDGE PLUGS & PRODUCTION PACKERS

# REGIONAL SUBSURFACE GEOLOGY

# Of the Midland Basin

**Here are the tectonics, structure, and stratigraphy of the Midland basin of West Texas, with special reference to the Permian system. The Midland basin has commanded industry-wide attention in recent years due to the prolific character of the Ellenburger structures of Ordovician age. More recently the development of oil fields in the Spraberry sands of lower Permian age has taken place throughout seven counties.**

**by G. Frederick Warn,* Roy P. Carmack,† and Raymond Sidewell‡**

THE tectonic and depositional history of the West Texas Midland basin is inferred largely from the kind, amount, and distribution of its sediments, in addition to the unconformities which mark them. These two histories are integral parts of the events affecting the greater Permian basin and its associated tectonic features. Diastrophic events affecting these features began between early and late Pennsylvanian time and were intermittent to continuous through most of the Permian period.

The Midland basin is long and relatively narrow with a north-northwest trend. The basin was in part formed during the deposition of sediments and was not directly associated with nearby rising highlands. In these two respects the Midland basin meets the requirements for an autogeosyncline as defined by Kay.[1] It is bordered on the east by the Eastern platform, on the north by the Matador arch, on the northwest by the Northwestern shelf, and on the west by the Central Basin platform. West of the latter is the Delaware basin of southeastern New Mexico and adjacent Texas. The Diablo platform constituted the southwest border of this basin. The Midland basin passes southward, with slight interruption, into the Val Verde basin. The Southern shelf, so-called, extends from west to east across the southern extreme of this basin. These tectonic features constitute the Texas Foreland System and were established during late Pennsylvanian and early Permian time.[2] Their full definition was expressed in Permian time.

The platform and shelf areas were developed initially with the Marathon flexuring and faulting and remained as relatively positive areas through most of Permian time. The Marathon disturbance strongly deformed early Pennsylvanian and older sediments of the Llanoria geosyncline and consisted primarily of compression and thrust faulting in the Marathon system. Flexuring had begun by late Pennsylvanian (post-Gaptank) time. The erosion of the newly created folds was followed by Permian deposition in the former sites of flexuring. Progressive onlap in the Permian created decidedly angular unconformities between the two systems in many parts of the area. The Marathon system suffered only epeirogenic-type uplift in Permian time.

The basins of the Permian Texas Foreland bordered the north and northeastern edge of the Marathon system. This epeirogenic belt covered the area of extreme Southwest Texas, the adjacent part of the present-day Mexican Highlands Province, and apparently continued eastward, southeastward, and finally northeastward along the Ouachita system of Northwest Texas.[3] The basins north of the foreland were features of pronounced local subsidence but maintained limited communication by several long narrow channels of which the Sheffield and Hovey are probably the best defined. Otherwise, the platforms and shelves made effective barriers between adjacent basins. The platforms converge northward on the arch (called also Range or Uplift) composed of pre-Cambrian crystallines. This arch is accepted generally as the westward extension of the Electra arch (called also Range or Uplift), the two linear uplifts constituting the Red River Uplift.[4,5] A synclinal sag situated at the north end of the Central Basin platform separated the platform from the Northwestern shelf. In the main, the Permian basin shelves formed the gently sloping margins of the basins, with the adjacent platforms making relatively flat, positive borders parallel to the shelves.

The Permian sediments of the Midland basin and its associated tectonic features constitute a complex of interfingering and interbedded facies (Fig. 1). These facies consist of variable marine clastics and calcareous sediments and red beds and evaporites. Their nature and distribution are, in a large measure, accounted for in the diastrophic peculiarities of the depositional sites. Sediments are thickest (7,000 to 10,000+ ft.) in the basins where subsidence was sufficiently continuous and rapid to allow the accumulation of permanent marine sediments in most areas. The shelves and platforms, however, were frequently close to the base level of deposition with their sediments distributed in accordance with the shifting profiles of equilibrium. Occasional interruptions to deposition along the shelves and platforms introduced both submarine and subaerial erosion. This resulted in fewer permanent sediments, thinner deposits, and more numerous and pronounced unconformities than are found in the basins. The lack of coarse clastics in the basins and most of the shelf areas is an indication the borderlands were either relatively low and stable or far removed from the depositional areas. The heavy mineral suites from the basin deposits suggest that bedrock in the source areas was weathered slowly and deeply, with nearly total removal of both unstable and metastable minerals.

### Wolfcamp Sediments

Deposition in the Midland and Delaware basins during Wolfcamp time was mainly in the form of gray to black shales. Some of the black shales are

*Assistant professor of geology, Texas Technological College; †geophysicist, Stanolind Oil & Gas Co.; ‡professor of geology and head of department of geology, Texas Technological College, all of Lubbock, Tex.

bituminous. The shales are gradational laterally or vertically into dark gray to black shaly and argillaceous limestones, or are interbedded with them. In the Midland basin some of the limestones are cherty. There are minor amounts of interbedded sand and sandy shale. Obviously these fine clastics do not reflect the post-Gaptank disturbance in the Marathon belt of the southwest. The inference that the Marathon lands to the south were low lying does not, however, eliminate the possibility of higher areas farther south in the Texas extension of the Ouachita system.

Epeirogenic-type uplift in the Marathon belt is apparent in post-Wolfcamp time. This is recorded in mild flexuring, uplift, and erosion of the Wolfcamp. Rejuvenation and increased erosion in the positive areas to the south are indicated by the pebbles and cobbles supplied to the early Leonard sea which encroached upon the site of the present-day Western Glass mountains. There is little or no evidence that this uplift affected the shelves and basins to the north and northeast.

### Leonard Sediments

Early Leonard deposition in the Midland basin began with approximately 300 ft. of dark shales, shaly limestones, and fine-grained sands, locally called the Dean sand. This was followed by the accumulation of gray limy shales, black shales, fine gray sands, silts, and interbedded thin limes and dolomites of the Spraberry section. The latter is overlain locally by approximately 150 ft. of Tubb sand deposits. Otherwise, shales, sandy shales, and gray limestones of the Clearfork overlie the Spraberry. These are, in turn, overlain by a variable thickness of sandstones frequently referred to as the Midland basin sand member. The Leonard epoch closed with the accumulation of approximately 1,600 ft. of San Andres limestones, dolomites and oolitic limestones.

The shelf deposits were mainly limestones and shales which interfingered landward with red beds and some evaporites. The black shales apparently accumulated in a cool, shallow, and quiet inland sea that was largely barred from ocean currents and tides by the higher, sill-like platforms. The waters of seemingly comparable present day seas have a temperature range of about 7° to 17° C. The steady accumulation of organic materials was probably permitted by coolness of the water and low oxidizing conditions. Poor ventilation in the deeper parts of the basin would have enhanced low oxidation.

The probable concentration of salinity, plus the generation of hydrogen sulfide and sulfuric acid in the stagnating bottom waters, would have discouraged destruction of organic matter by living marine forms. A reducing environment with a pH value of seven or less seems a reasonable reconstruction. Such conditions would have favored accumulation of potential source bed materials.

Evidently, the limestones and calcareous shales resulted from biochemical activity in a normal, shallower marine environment, or in one which periodically became normal. This could have resulted from improved connections with the open sea via the narrow channels. Another explanation lies in the behavior of the basin barriers. Downwarping of the entire foreland unit would have lowered these barriers, allowing increased circulation of waters across the platforms and shelves and a resulting increase in ventilation. Warmer waters in these areas would have invited increased biologic activity.

Limy deposits probably occurred when the pH value was raised to seven and one-half or eight under mildly oxidizing conditions, alternated repeatedly with the previously described conditions of cool, stagnant water deposition.

The fine-grained sandstones and siltstones show that no major change occurred in land or sea level. This is suggested by the universally fine texture and the fact that unconformities below the sands are lacking or of small magnitude. Less complete sorting, plus increasing amounts of interstitial silt, from north to south suggests that the source materials came from the south.

The Matador-Electra uplift across the north was, at this time, undergoing subsidence and burial, hence cannot be considered as a source of Leonard clastics for the Midland basin. A similar condition existed in the Amarillo-Wichita ranges, except that the Wichitas kept a few peaks above sea level during all of the Permian. However, the Plainview basin north of the Matador-Electra uplift should have received any clastic sediments carried southwestward from the Wichitas.

Concurrent deposition of shales and limestones shelfward seems to eliminate

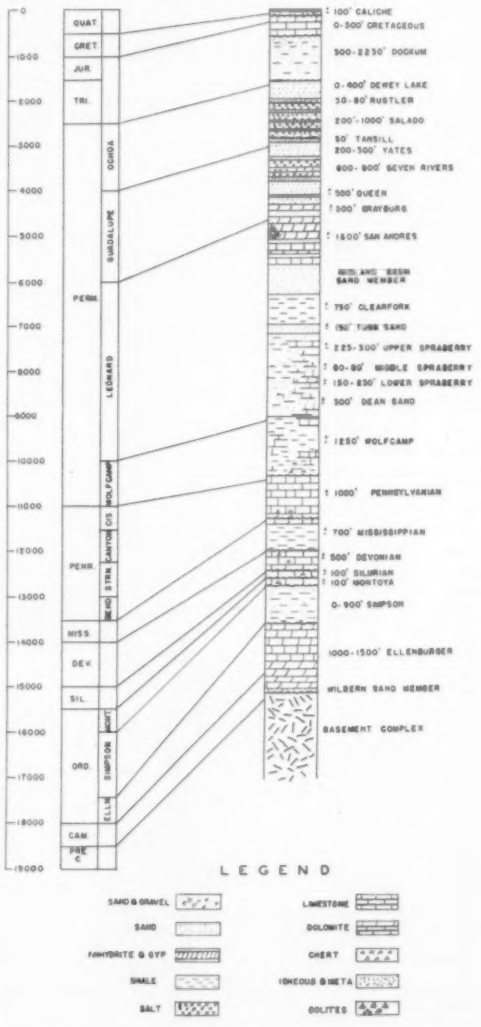
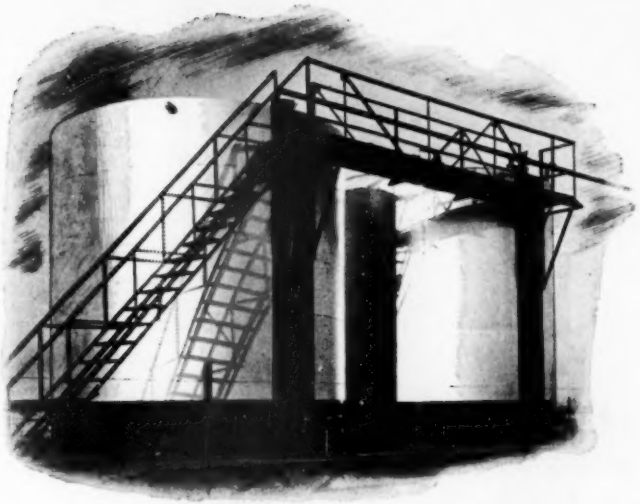



Fig. 1—Generalized stratigraphic column of the Midland basin.

1st IN THE Permian Basin N.M. TEXAS MEXICO



WITH

# Welded LEASE TANKS

## ...no leaks...no seeps!

. . . and no unseen bottom seepage loss that might go unnoticed for years — or never be discovered. Thickness makes a big difference, too, in corrosive areas. Sivalls shop welded tanks are manufactured in all standard bolted tank sizes and in thicknesses up through 5/16 inch plate. They're delivered to your lease, including the 1000 barrel size, shop tested, painted and ready for hook-up and use.

SIVALLS TANKS, INC. ODESSA, TEXAS

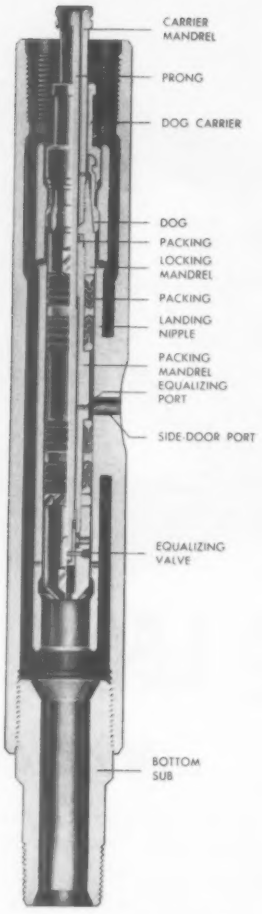
WE HOPE TO SEE YOU at THE PERMIAN BASIN OIL SHOW

October 16th thru the 19th. in Odessa

We're building the bean pot again for the Odessa Chuck Wagon Gang so come on out and have chuck wagon chow and visit our exhibit.

SIVALLS TANKS, INC.

P. O. BOX 1152 ODESSA, TEXAS




announcing a new side-door assembly with a large by-pass for formation-fracturing

Type A Otis Side-Door Choke

The Type A Otis Side-Door Choke and Landing Nipple assembly is a new Otis dual-completion tool that provides maximum flow capacity, and is especially suited to formation-fracturing and other similar well completion operations. A new design, consisting of a landing nipple mounted concentrically within an outer flow sleeve, allows the assembly to perform all of the various functions of a conventional Otis Side-Door Choke and Landing Nipple assembly, without restricting the flow to the bore of the choke. The large by-pass area around the seating nipple provides a flow course of more than two square inches for full production through the tubing, or for acidizing, conditioning mud, taking bottom-hole pressures, and various other operations. The new Type A Choke also has a built-in equalizing device to facilitate pulling the tool in the event unbalanced or packed-off pressures prohibit full equalization across the tool. Inasmuch as the seating nipple is independent of the tubing nipple, the same choke can be run in either a 2" or 2½" string.

This new choke assembly is another Otis tool that affords exclusive applications not available in any other production equipment on the market. If you want a better way to get better production from your operations, ask your nearest Otis office, or contact us in Dallas, for full details on this and other Otis single- and two-zone production equipment. There's no obligation, of course.

OTIS PRESSURE CONTROL, Inc.
6612 Denton Dr. • Box 7206 • TWX DL-220 • Dallas, Tex.
DALLAS • HOUSTON • CORPUS CHRISTI • LONGVIEW • VICTORIA • FALFURRIAS
ODESSA • NEW IBERIA • SHREVEPORT • HOUMA • OKLAHOMA CITY • ELK CITY


the possibility of fine sands shifting basinward from the Ouachita borderlands to the east and southeast. To the northwest and west were the submerged shelves and platforms.

Materials derived from the Ancestral Rockies to the far northwest could have been intercepted by intervening basins or platforms long before reaching the Midland basin. This leaves the subdued borderland of the Marathon system on the south as the probable provenance of basin clastics in Leonard time. The alternation of sand and shale deposition suggests that the borderland was mildly unstable.

Deposition of the Spraberry sand was followed by the accumulation of about 800 ft. of Clearfork shale interbedded with thin limestones. There is no abrupt change indicated in the depositional environment since the Spraberry sands grade upward gradually through sandy shales to black shales. Northward these sediments change to silty limestone overlain by crystalline limestone.

The change to black shales implies a gradual lowering and deepening of the basin while the shelves and platforms remained relatively stationary. The shales change shelfward to dolomite, anhydrite, gray shales, and thence into red shales. These sediments were deposited in a neritic environment influenced strongly by shallow water, aridity, and conditions of oxidation. Bartley[6] suggests that reactivation of the older pre-Permian positive areas is reflected in truncation of part of the Clearfork section and in the fracturing of the Spraberry shales in the southern part of the trend.

The Clearfork shales change upward to sands, dolomite, shales, and sandy shales of the Midland basin sand and/or the San Angelo. Shelfward they change to fine sandy dolomites and siltstones.

These deposits apparently accumulated in a normal marine environment when basin subsidence ceased, allowing sediments to fill the deeper parts of the basin. The presence of black shales in the lower part of the overlying San Andres shows that the adjustment of sedimentation to basin subsidence was gradual, if not mildly oscillatory.

During the early part of late Leonard time, blanket sands, the San Angelo and Glorieta, were spread across the eastern and northwestern shelves. The lone fact that the sands are coarser southward is only suggestive of a Marathan provenance and possibly of mild uplift in that area.

### Guadalupe Sediments

No sudden change in the tectonic setting is apparent in the basin deposits at the close of Leonard time. The

Grayburg "formation," approximately 300 ft. thick, is the basal part of the Guadalupe (Whitehorse) series. Dolomites, dolomitic limestones, and fine gray sands, with some evaporites in the Midland basin suggest shallow-water deposition and the probable beginning of sea-level retreat, attended by increasing desiccation.

The dolomitic sediments are, apparently, in part primary deposits. They pass upward into about 1,500 ft. of sands interbedded with anhydrite, gypsum, salt, and local conglomerates or conglomeratic sands of the Queen, Seven Rivers, Yates, and Tansill formations. The sediments in the southern part of the basin include shales, sand stones, and conglomerates, representing a near-shore facies. Guadalupe deposition in the Midland basin closed with the accumulation of the Tansill sandstone.

Shallow marine sediments were deposited in the agitated waters of the Delaware basin in early Guadalupe time. These sediments grade upward into relatively quiet-water basin-type deposits of black organic limestones. These are bordered by shallow-water reef limestones and dolomitic limestones.

Marked unconformity is, for the most part, absent in the basin deposits. Both nondepositional and erosional unconformities are common in the marginal sediments of the shelves and platforms. Overlap is common also in these areas.

### Ochoa Sediments

Evaporites and red-bed clastics filled both the Midland and Delaware basins in late Permian time. It appears probable that the Central basin platform was submerged by the Ochoa sea, allowing free passage of marine water between the two basins. Both basins, however, had lost their main connections with the open sea. Increasing amounts of chemical precipitates—dolomite, anhydrite, gypsum and salt—resulted from the gradual concentration of the late Permian brines. Occasional influxes of normal marine water followed by renewed isolation and desiccation were probable.

Initial Ochoa deposition in the Midland basin was in the form of basin sands, similar to those of the older Tansill sandstone. Renewed subsidence in early Ochoa time would have allowed larger amounts of the coarser clastics to be swept basinward from the shelves. Following sandstone deposition, open passage with the sea had been seriously restricted and evaporite and red-bed accumulation began. The deposits indicate that sedimentation was generally in excess of basin subsidence. Sedimentation was seemingly continuous in the basin proper, but thinning

*FOR DUAL-COMPLETIONS—*

**Otis Type H Nipple Assembly**— Before you complete or recomplete a two-zone well, ask your nearest Otis Office about the many exclusive operating advantages you can expect when you run in an Otis "Selective" Cross-Over Nipple Assembly. You can cross over the upper zone flow from the casing to the tubing (or vice versa) simply by pulling one removable pack-off assembly and running in another. This can be done by wire line operations on the surface with a minimum of downtime — *under pressure, without killing the well, pulling the tubing, or disturbing the packers.* Other features include testing, acidizing, plugging, formation-fracturing, repairing well head connections under pressure, and similar operations *after* the packers are permanently set. The Otis Nipple Assembly can be run with regular production packers of standard manufacture; an Otis-Baker installation, for example, is an Otis Type H Nipple and removable pack-off assemblies and a Baker Oil Tools Model D Retainer Production Packer. We'll be glad to give you more details if you'll contact Otis Pressure Control, Inc., 6612 Denton Dr., P. O. Box 7206, TWX DL-220, Dallas, or the Otis office in ***Houston, Corpus Christi, Victoria, Longview, Falfurrias, Odessa, New Iberia, Shreveport, Houma, Okla. City, or Elk City.***

PRESSURE CONTROL · OTIS · SERVICE · EQUIPMENT

***Otis Pressure Control, Inc.***

and interfingering of beds, plus unconformable relationships are evident on the shelves and platforms.

The Salado, Rustler, and Dewey Lake formations consist of approximately 860 ft. of evaporites and red beds deposited in a restricted, highly saline environment with a paucity of organic forms. The pH value of the waters probably exceeded eight, and the salinity probably reached a concentration of more than 200 parts per thousand. The retention of oxidized iron compounds in the sediments points to the lack of organic materials, including reducing types of bacteria. Climatic environment was, at least, locally arid.

Ochoa deposition ceased after the accumulation of zero to 400 ft. of Dewey Lake silts and sands. The basal 10 ft. contain well-frosted quartz grains [8] that were probably reworked marginal dunes. The new influx of sand must find an ultimate explanation in slight to moderate rejuvenation of the borderlands, although increased capacity and competency of the hinterland drainage could have resulted from larger stream volumes derived from increased precipitation there. The latter would explain the cessation of chemical precipitation in the basin in spite of the continued shrinkage of the Permian basin sea in a west and southwest direction.

The Texas foreland was raised by epeirogenic-type uplift at the close of the Permian. This left much of the Permian section exposed to subaerial erosion until deposition of the Dockum (Triassic) began. The Dockum group consists of 300 to 2,230 ft. of continental sediments, belonging to the Chinle and Santa Rosa formations. These sediments were derived mainly from weathering and erosion of the Ancestral Rockies to the northwest in northern New Mexico and Central Colorado. Marine deposition was not resumed until the Lower Cretaceous (Trinity) sea transgressed part of the Texas foreland from the south and southeast.

### Stratigraphy and Lithology of the Spraberry

The Spraberry formation is nearly continuous across the Midland basin. Typical lithology is a gray, very fine-grained sandstone. The sandstone is associated with stringers of limestone and dolomite and interbedded silts and dark gray to black shales. Average thickness of the Spraberry formation is approximately 1,000 feet. The maximum thickness reported in the southern part of the basin is 1,200 ft., and in the north, 1,500 ft. The marginal sands appear to grade rather abruptly through shales into limestones northward and eastward, and into silty sandstone, shale, and shaly limestones southward.

Westward the sands change mainly to shale. The Spraberry-type section cited by McLennan and Bradley [9] is in Seaboard's Spraberry 6-D, Section 38, Block 34, 5n in Spraberry field of eastern Dawson County.

In the Midland basin the Spraberry section is overlain locally by approximately 150 ft. of arenaceous sediments assigned to the Tubb sand. The Tubb is overlain by the Clearfork, consisting mainly of gray crystalline limestones and shales. The lower part of the Clearfork contains considerable limy shale, grading upward from sandy shale. The Spraberry is underlain by 350 to 450 ft. of unnamed dark shales and limestones. The Dean sand underlies the shale-limestone section.

The Spraberry formation consists of two or three prominent sand members, each separated by relatively thick intervals of shales and sandstones and thin limestones and dolomite (Fig. 1). Where three sand members occur in the section, they are referred to as the upper Spraberry, the intermediate zone (or middle Spraberry) and the lower Spraberry.[10] The sands are encountered at depths of —2,500 ft. on the eastern margin of the trend to —5,000 ft. on the western side.

In a "typical" section through the formation the upper Spraberry sand is 200 to 300 ft. thick and is composed of several sand zones. The uppermost zone is encountered at about 7,000 ft. below the surface and is known locally as the "Floyd" sand. The sand zones are 30 to 60 ft. thick and are separated by gray to black shales, limy stringers, and argillaceous limestone. The sands are gray and fine grained to silty, grading northward into limestone and dolomite. The estimated net pay is about 90 ft. thick.

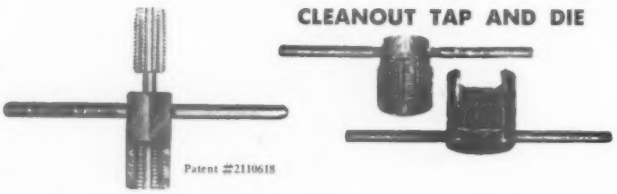
The intermediate Spraberry consists of 60 to 80 ft. of alternating sands and calcareous shales with limestone stringers. It is separated from the upper sand by approximately 300 ft. of dark shale, limy shale, and shaly limestone. Little or no production is reported from this member.

The lower sand lies approximately 160 ft. below the sand of the intermediate zone. It consists of 150 to 250 ft. of sand, shale, and thin limestones. There are three to four prominent sand zones, each 30 to 50 ft. thick and separated by gray to black limy shales and thin limestones. The largest oil production appears to come from the lowermost sand zone. The estimated net pay is approximately 170 ft. thick.

Numerous wells have penetrated the Spraberry in the northern portion of the Midland basin with little promise of commercial production. Core studies


BAIRD - - - TOOLS

CLEANOUT TAP AND DIE




For — cleaning up smashed or dirty threads on —

★ Slush Pumps
★ Piston rods
★ Valve cover and cylinder head studs
★ Extension rods —
★ Sucker rods —
★ Tubing on line pipe
★ Blowout preventer studs

Any diameter — any number of threads per inch.

*Always available at your supply store

Baird Manufacturing Co.
Box 380 — Tulsa

# "We're In Favor of Every Drilling Platform In America!"

***Off-shore, on-shore, derrick-side, or road-side, if it's core analysis you need, Core Lab has the equipment to fit the location!***

*All services are described and illustrated in Core Lab's 30-page Price Schedule. A copy is yours for the asking.*

**CORE LABORATORIES, INC. ● in all active areas**

**Dallas, Houston, Corpus Christi, Midland, Abilene, Ft. Worth, San Antonio, Tyler, Wichita Falls, Lubbock, Oklahoma City, Tulsa, Great Bend, Shreveport, Lafayette, New Orleans, Natchez, Bakersfield, Denver, Sterling, Worland, Williston, Bismarck, El Dorado, Farmington, Lovington, Calgary, Edmonton, Venezuela**

# At Last...

## A LONG-STROKE HYDRAULIC PUMPING UNIT

*Designed—Built—Priced*

## FOR STRIPPER WELLS

*featuring* **the amazing Varicycle principle which produces a pumping well at almost constant flow!**

### THE SALENTINE

# VARICYCLE

Increased production—both immediate and ultimate.

Sanding up eliminated, or greatly reduced.

Gas lock eliminated.

Higher volumetric efficiency in working barrel.

Maximum production without pumping off or pounding fluid.

Less wear and failure of all parts, such as rods, tubing, pumps, balls, seats.

Easily maintained by regular field personnel, because of extreme simplicity and practicability of design and construction.

No concrete foundation is usually necessary.

Quick and easy set-up. Some machines are being used as portable test units.

Completely field-proven — more than twelve years in development. No "bugs" to work out at the customer's expense.

The present perfected models have been in use by both majors and independents for more than five years.

*Low first cost. Prices competitive with conventional mechanical equipment.*

Qualified representatives for sales, service, and parts are now located at convenient points throughout the oil country.

Immediate delivery at present.

## *LET US BACK OUR CLAIMS WITH PROOF ON YOUR WELL!*

**S. C. CARTER COMPANY, INC.**
**1900 Santa Fe Avenue**
**Los Angeles, California**

**SALES AND SERVICE REPRESENTATIVES:**

Artesia — Borger — Bossier City — Carmi — Casper
Dallas — Los Angeles — Odessa — Pampa — Wichita Falls

**IN CANADA**
Engineering Specialties Company
Calgary — Edmonton

reveal that the sand becomes increasingly calcareous northward where the deposition of shelf limestones was dominant. The sands in Dawson County in the northeast part of the basin are gray, compact, and fine grained with interbedded thin shales and limes. Production from the upper Spraberry was encountered in the Spraberry Deep field where, to date, there are over 1,500 proven acres. The oil recovery here averaged 75 bbl. a day per well in January 1951 with a total production of 72,180 bbl. The estimated ultimate recovery was 10,500,000 bbl.[17] The cumulative production as of April 11, 1952, was 1,829,489 bbl.[18]

The Spraberry sands in the southern part of the basin are gray, dense, fine grained, and silty. They contain laminated shale and shaly sand interbedded with thin black shales. The sands and shales show a marked development of vertical fracturing. Here the Spraberry is overlain by thick black shales and underlain by dark shales and limestones. The Dean sand (±120 ft.) is below this section and consists mainly of white or gray-to-brown, fine-grained sandstone. The sandstone contains thin units of brown, dense limestone and black shale. The type section is between 7,990 and 8,190 ft. in Gulf Oil Corp.'s 1 Dean north of Spraberry field in Dawson County.[19]

The largest field in the southern part of the basin is Tex-Harvey with over 9,000 acres of proven production. The productive limits of this field are still undefined. Average production during January, 1951 was 79 bbl. per well per allowable day.[14] The estimated cumulative total production April 11, 1952 was 8,382,333 bbl.[15]

McLennan and Bradley[16] state that the Spraberry belongs at or near the top of the Wolfcamp. They report fusulinids of Wolfcamp age between the Dean and Spraberry as well as below the Dean. Well correlations eastward from the Midland basin suggest that the base of the Spraberry is near the top of the Wolfcamp and that the Dean is near the base of the Coleman Junction limestone. Northward the Spraberry appears to grade into Leonard limestones and dolomites. A possible extension of the Spraberry westward across the Central Basin platform would give approximate correlation with the top of the Abo, while a possible correlation through the Sheffield channel would place the upper Spraberry within the Bone Spring of the Delaware basin.[17]

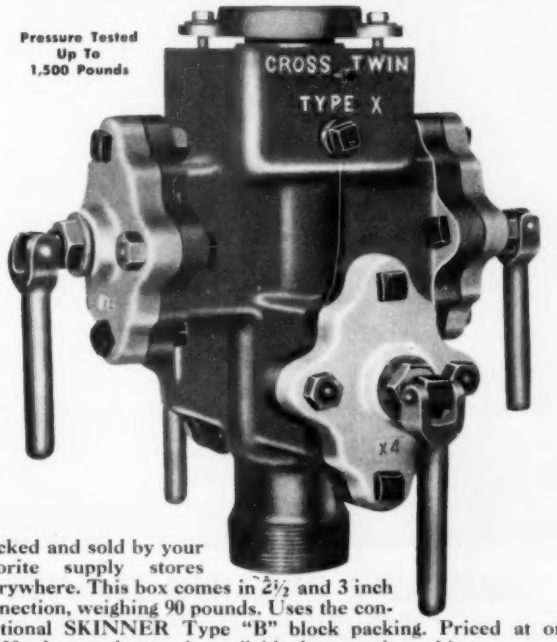
### Structural Features of the Spraberry

Several factors control the attitudes of the Permian sediments in the Midland basin. The initial attitude is due to the thinning of the stratigraphic units shelfward, possibly excepting the northern part of the Spraberry trend. This thinning, plus the effect of basin subsidence during Permian sedimentation, gave a primary dip basinward, especially from the eastern and western borders. Differential compaction, controlled by argillaceous sediments in the basin, shelf margins, and over the platforms, tended to exaggerate the primary dips. Differential compaction also resulted in a draping effect across the platforms and local buried highs. King[18] reports buried highs of pre-Wolfcamp age in southwest Texas. Senning[19] suggests local Spraberry structures associated with reefing in Pennsylvanian or older sediments in the Midland basin. These reefing effects are reported from central Martin County into Dawson and Borden counties. He reports a structure in Dawson County with about 2,400 ft. of reefing and 250 ft. of productive relief in the Spraberry situated above the buried structure. Carlson[20] states that productive closure in Benedum and Cities Service "AH" University fields is apparently associated with pre-Permian structure. Bartley[21] states that part of the Spraberry production is from anticlinal-type structures in the south part of the trend. These highs appear to overlie deep-seated Ellenburger structures.

Some of the flexures in the Delaware basin are evidently related to


**Introducing the All-New SKINNER Type "X"**

**CROSS TWIN DOUBLE PACKED STUFFING BOX**




Stocked and sold by your favorite supply stores everywhere. This box comes in 2½ and 3 inch connection, weighing 90 pounds. Uses the conventional SKINNER Type "B" block packing. Priced at only $55.00. A pumping tee is available for any size tubing.

**SKINNER BROTHERS COMPANY**

MEMBER THE PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

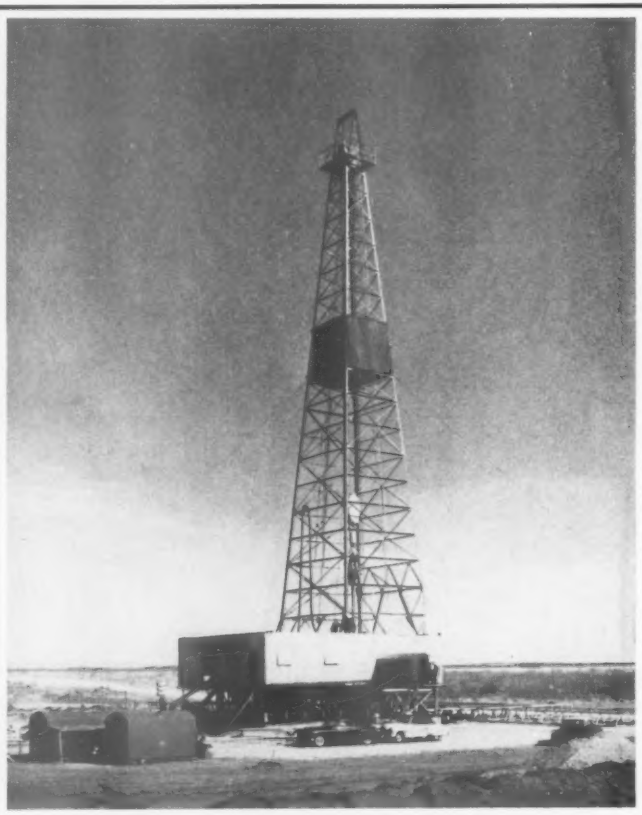
P. O. Box 865 — 1317 E. 5th Place

TULSA, OKLAHOMA

Telephone 2-9227 — Teletype TU-733

post - Wolfcamp differential movement wherein the basin margins moved slightly upward relative to the concurrent downsinking of the basin. Similar differential tectonic adjustments were recurrent in late Leonard time.

A large, north-trending monoclinal flexure forms the major tectonic feature of the Spraberry trend.[2,3,4,5,6,7,8,9] Basin subsidence apparently resulted in an exaggerated local steepening of the Spraberry dip westward and a strike roughly parallel to the basin margin. The strongest development is noticeable along the eastern edge of the basin where submarine relief was greatest. The average westward dip is slightly more than ½°. The dip flattens locally in Tex-Harvey field to produce a well-defined structural terrace.[29] Updip pinchouts and facies changes evidently caused hydrocarbon accumulations along the monoclinal trend. The eastward dip along the western margin of the basin is modified greatly due to the lateral change from sandstone to shale westward. A number of small structural noses are superimposed upon the monoclinal flexure. Some oil has been found where permeability loss is in a direction opposite to the plunge of the noses. Some observers have suggested that production and bottom-hole-pressure data show that fields producing directly from the monocline are drawing from a common reservoir.[29]

**COMPLETE DRILLING SERVICE TO 20,000 FEET**

*Tri-Service Drilling Company, Inc.*

Central Building • Midland, Texas

P. O. Box 1785 M. W. Branum, Pres. Telephone 4-7702


### References


1. Kay, G. Marshall, "North American Geosynclines," Geol. Soc. Amer., Memoir 48, 1951.
2. King, Philip B., "Permian of West Texas and Southeastern New Mexico," Bull. A. A. P. G., (West Texas-New Mexico Symposium) Part II, Vol. 26, No. 24, April 1942.
3. Eardley, A. J., "Structural Geology of North America."
4. King, Philip B., op. cit.
5. Eardley, A. J., op. cit.
6. Bartley, J. H., "That Spectacular Spraberry," (A symposium) Part 3, "Stratigraphy and structure of the Spraberry trend," The Oil and Gas Journal, Vol. 50, No. 31, pp. 101 and 112, December 6, 1951.
7. Page, Lincoln R., and Adams, John Emery, "Stratigraphy, Eastern Midland Basin, Texas," Bull. A.A.P.G., Vol. 24, No. 1, pp. 52-64, January 1940.
8. Page, Lincoln R., and Adams, John Emery, op. cit.
9. McLennan, Lamar, Jr., and Bradley, H. Waring, "Spraberry and Dean sandstones of West Texas," Bull. A.A.P.G., Vol. 35, No. 4, pp. 899-915, April 1951.
10. Mardock, E. S. and Myers, Jack P., "That spectacular Spraberry," (A symposium), Part 2; "Radioactivity logs define lithology in the Spraberry formation," The Oil and Gas Journal, Vo. 50, No. 30, pp. 96-102, November 29, 1951.
11. Lubbock Avalanche Journal, Oil News, June 21, 1951.
12. Carlson, Roy F., "Busiest drilling area," The Oil and Gas Journal, Vol. 50, No. 50, p. 64, April 28, 1952.
13. McLennan, Lamar, Jr., and Bradley, H. Waring, op. cit.
14. Carlson, Roy F., "Active area-Spraberry sand undergoing rapid development," The Oil and Gas Journal, Vol. 50, No. 7, p. 149, June 21, 1951.
15. Carlson, Roy F., "Busiest drilling area," The Oil and Gas Journal, Vol. 50, No. 50, p. 64, April 28, 1952.
16. McLennan, Lamar, Jr., and Bradley, H. Waring, op. cit.
17. Ibid.
18. King, Philip B., op. cit.
19. Senning, R. C., "The Spraberry play in West Texas," World Oil, Vol. 133, No. 4, September 1951.
20. Carlson, Roy F., "Active area-Spraberry sand undergoing rapid development," The Oil and Gas Journal, Vol. 50, No. 7, page 149, June 21, 1951.
21. Bartley, J. H., op. cit.
22. Ibid.
23. Carlson, Roy F., "Spraberry puzzle," The Oil and Gas Journal, Vol. 50, No. 22, pp. 150-152, October 4, 1951.
24. Christie, R. S. and Blackwood, J. C., "Production performance in the Spraberry," The Oil and Gas Journal, Vol. 50, No. 48, pp. 107-116, April 7, 1952.
25. Harris, Sidon, "What reserves can we expect to find in the Permian Basin," World Oil, Vol. 133, No. 4, pp. 91-98, September 1951.
26. McLennan, Lamar, Jr., and Bradley, N. Waring, op. cit.
27. Senning, R. C., op. cit.
28. Carlson, Roy F., "Active area-Spraberry sand undergoing rapid development," The Oil and Gas Journal, Vol. 50, No. 7, p. 149, June 21, 1951.
29. Staff article, "Will the Spraberry pay out?" World Oil, Vol. 135, No. 1, pp. 50-51, July 1952.

# HERE'S *THE ANSWER* TO YOUR WIRE LINE SPOOLING *PROBLEMS...*

## LeBus Grooving and Wire Line Spooling Service



Angle control section of LeBus grooved drum illustrating load being picked with 10 to 15 wraps of line on drum, requiring from 100' to 250' less wire line in spooling system



This photo shows the second layer of line being wrapped on the parallel section illustrating progressive grooving on 75% to 85% of preceding layer of wire line

## *Advantages of* LeBus Grooving and Wire Line Spooling

LeBus International Engineers, Ltd. definitely have the answer to Wire Line Spooling problems because of more and more installations of their Grooving and Wire Line Spooling System. Contractors find the LeBus system pays for itself, and makes them money through increased service from wire line and the reduction in over all drilling time. Check for yourself, you'll find the LeBus Grooving and Wire Line Spooling Service will do for you what it has done for others. GET FULL DETAILS . . . NOW!

- ✓ SAVES VALUABLE DRILLING TIME
- ✓ No Cutting-in, Squeezing, Pinching or Wire Line Whip
- ✓ REDUCES WIRE LINE COSTS
- ✓ Increases Ton-Miles on Wire Line
- ✓ Smooths out Wire Line Travel on Drum
- ✓ Faster Drum End Cut-offs and changing of Wire Line
- ✓ Added Efficiency to Rig and Safety for crew

**LEBUS** INTERNATIONAL ENGINEERS LIMITED

Executive Offices: 305 Wichita Natl. Bank Bldg., WICHITA FALLS, TEXAS
SALES, SERVICE Control and Warehouse Stock LONGVIEW, TEXAS

*Complete Sales & Service in Every Oil Center—Contact Your LEBUS REPRESENTATIVE For Full Information!*

**VISIT OUR BOOTH — PERMIAN BASIN OIL SHOW, BUILDING B, ODESSA, TEXAS — OCTOBER 16-19**

# 10 Rigs Active in Strawn Reef Search In Schleicher County

Drill busy in 4 fields near Eldorado, Texas; allowable totals 7,846 bbl. per producing day.

**by Joseph A. Kornfeld**
District Editor

HIGH potentials, thick pay sections, and medium-depth drilling have spurred the search for Pennsylvanian Strawn reef structures in Schleicher County on the Edwards plateau in West Texas. Currently, 10 rigs are active in the development of Hulldale, Hulldale North, Neva West, and Page fields in Schleicher County. Aggregate new allowable from these fields totaled 7,846 bbl. per producing day for the month of October 1952. A breakdown of this allowable schedule appears in Table 1.

Reservoir features characteristic of these new Strawn reef developments include: (1) high effective permeability, (2) great pay thicknesses, (3) favorable ratios of production to pressure decline, (4) high potentials with most wells completed natural and (5) a firm demand for crude oil from the area, with a direct pipe-line outlet.

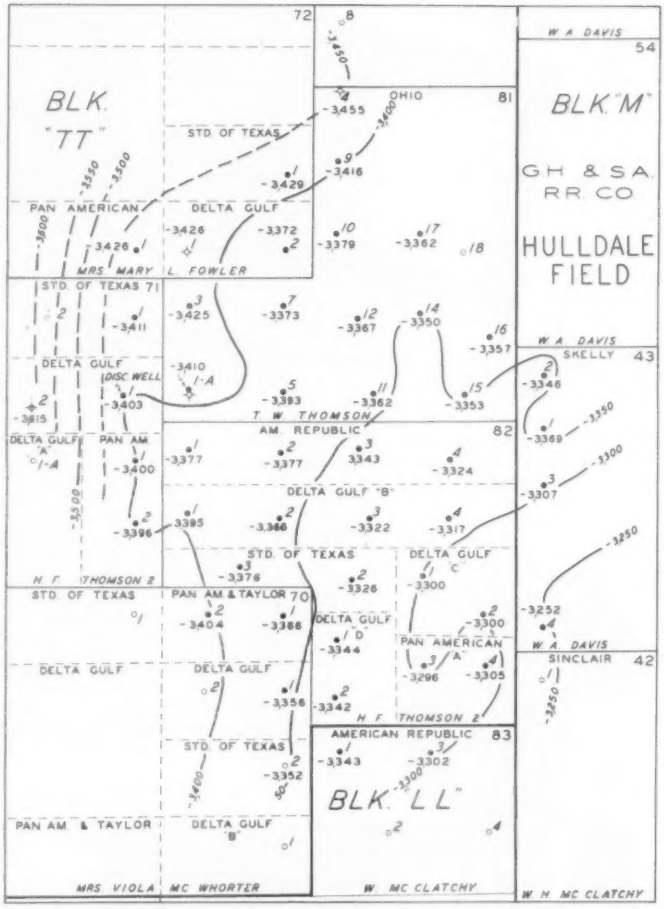
### Geophysical Background

In the Edwards plateau region, the cover of Edwards limestone makes it difficult to obtain satisfactory reflections from seismic shooting. Consequently the principal geophysical method employed in mapping the Edwards plateau region was refraction shooting conducted principally from 1941 to 1948.

Refraction techniques employed in the area comprised spacings of a minimum of 20,000 ft. from shot point to detector spreads. In some instances these ranged up to 70,000 ft.; however, for normal surveys refraction spacings ranged from 20,000 to 45,000 ft.

In refraction shooting in Schleicher County, amount of charge size has been from 2½ to 5 lb. in some cases; however, the size has ranged up to 1,000 lb., which proved to be the economic limit.

In recent months, seismic-reflection surveys using improved instrumenta-




**REEF STRUCTURE** of Hulldale field is reflected in this subsurface structure contour map prepared on top of the first effective porosity. (Contour interval: 50 ft.).

tion and detector arrangements have obtained favorable results in Schleicher County.

### Field Data

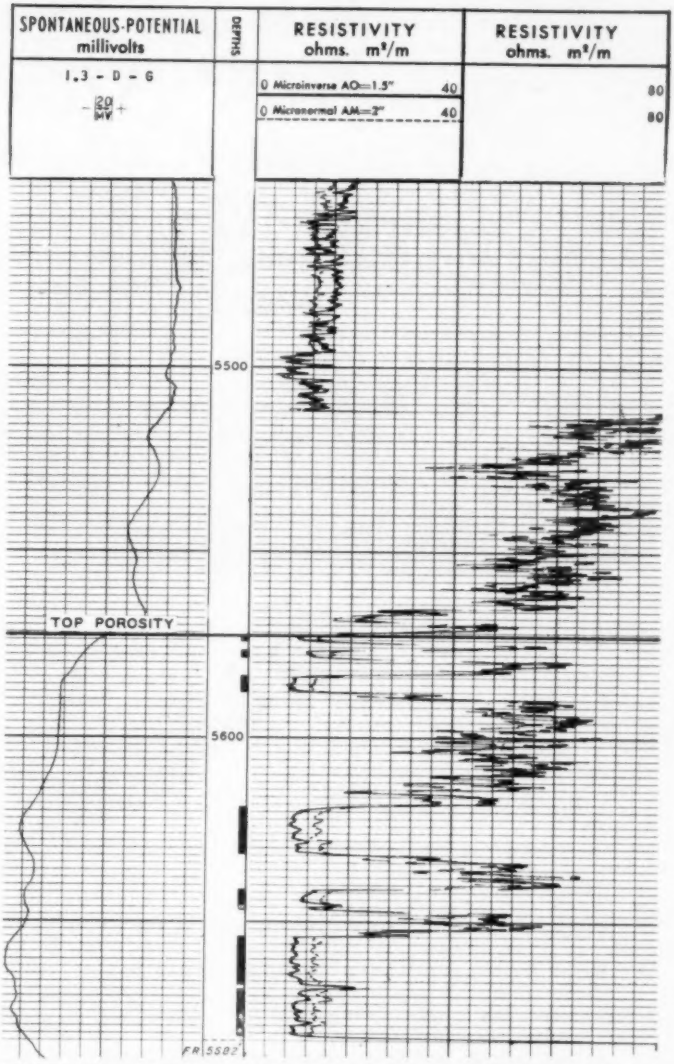
**Hulldale field . . .** This field was discovered on October 20, 1950, by Delta Gulf Drilling Co., of Tyler, Tex. Its 1 H. F. Thomson, in Section 71, Block T.P., was completed for an initial potential of 364 bbl. of oil and no water in 6 hours through a ¾-in. tubing choke; calculated daily rate based on this test was 1,456 bbl. of oil per day, 42° A.P.I. gravity. Gas-oil ratio was 770 cu. ft. per bbl.

On November 13, 1950, the Railroad Commission of Texas assigned discovery allowable rights of 120 bbl. per day exempt from shutdown days. The field was designated "Hulldale (Pennsylvanian reef) field." An order adopting field rules to govern field development was issued on July 2, 1951. Discovery allowable was discontinued on May 24, 1951, and the allowable changed to 102 bbl. of oil per producing day.

Field status as of October 1, 1952, showed the following: 40 producing wells completed, all flowing except one. Three dry holes have been drilled. One northwest of the field entered reef section below oil-water interface. Another to the north found the Strawn reef section nonporous.

**Local structure . . .** Schleicher County is situated on a southwestward-plunging terrace of the eroded Ellenburger dolomite and many reefs of Strawn age have been built up on essentially flat surface. An effective presentation of the local structure of the Strawn reef in Hulldale field is shown in Fig. 2, which is contoured on top of the effective porosity. This portrays a productive relief of at least 152 ft. with eastern, southern, or northern limits not yet defined. Nearly all of this productive relief is contained in the oil column although the most southeasterly well, Sinclair 1 W. H. McClatchy, NW NW 42, Block M, may have entered a gas-oil interface.

**Gas-oil interface . . .** This well topped the Strawn reef at 5,530 ft. (—3,265 ft.) and first porosity at 5,556 ft. (—3,291 ft.). Drill-stem test was run at 5,635 ft. with packer set at 5,585 ft. With tester open for 10 minutes gas flowed after 1 minute with flow estimated at 5,000 M.c.f. per day; shut-in pressure was 2,225 psig. Gas-oil contact is indicated at 5,635 ft. (—3,370 ft.). After plugging back from total depth of 5,690 ft. to 5,670 ft. and setting long string, the pipe was perforated from 5,633-61 ft. and completed for an initial Railroad Commercial potential of 789 bbl. of 40.3° oil and no water per day through a ½-in. choke. Initial gas-oil ratio was 742 cu. ft. per bbl.




**POROSITY DISTRIBUTION** of the Strawn reef reservoir in the Hulldale field is typified by this MicroLog survey of the pay section in Skelly Oil Co. 3 W. A. Davis, Section 43, Block "M," GH&SARR Co. Survey. Total depth is 5,682 ft., 54 ft. above the field oil-water contact.

The oil-water interface in reservoirs of this type is expected to be variable to a limited degree. One source places this interface as high as —3,470 ft., which is a fairly conclusive and consistent subsea depth as shown by various tests and cores; however, some water has been found as high as —3,450 ft.

Estimates of porosity for the gross reef section averages 8 per cent while the average permeability for the gross section is estimated at from 20 to 50 md. Reservoir data including properties of reservoir crude, reservoir pressures, and the like are summarized in Table 2.

Principal operators in Hulldale field are American Republics Corp., Delta Gulf Drilling Co., Pan American Pro-

*(Continued on page 144)*

# Make Our Stores YOUR Stores

IVERSON stores are strategically located to the oil fields. Store managers, field representatives and store personnel join in their desire to help you produce most at least cost, in drilling, production or refining. You'll find them a good group to get acquainted with for they are happiest when they can be of service to you.

OFFICES:
FORT WORTH
TEXAS

## IVERSON SUPPLY COMPANY

DRILLING-PRODUCTION AND REFINERY EQUIPMENT
P.O. BOX 1439 TULSA 1, OKLA.

OFFICES:
MIDLAND
TEXAS

*What's Their "Percentage of Favorability?"*

# Petroleum Possibilities in Eddy And Chaves Counties, New Mexico

Intermediate areas are indicated to have highest percentage of favorability for accumulations of petroleum; areas of second highest percentage are the basin deeps.

**by Phil D. Helmig**

TABLE 1—GENERALIZED CROSS-SECTION SHOWING LATERAL EXTENT OF STRATA IN EDDY AND CHAVES COUNTIES

**Chaves County**

| Formation— | Approx. thickness (ft.) | Reservoir — Type | Reservoir — Per cent |
|---|---|---|---|
| Whitehorse | 900 | Sand | Fair |
| San Andres | 1,200 to 1,500 | Dolomite | Poor |
| Glorietta | 20 | Sand | Poor |
| Yeso (Clearfork) | 2,200 | Dolomite and shale sand | Poor |
| Abo | 800 | Lower part dolomite | Fair |
| Wolfcamp | 200 to 400 | Limestone | Good |
| Pennsylvanian | 0 to 3,000 | Limestone | Good |
| Siluro-Devonian | 100 to 400 | Dolomite | Excellent |
| Ordovician (Ellenburger) | 200 to 300 | Dolomite | Good |

**Northern Eddy County**

| Formation— | Approx. thickness (ft.) | Reservoir — Type | Reservoir — Per cent |
|---|---|---|---|
| CAPITAN SERIES: | | | |
| Yates | | Sand | Good |
| Seven Rivers | 900± | Dolomite | Good |
| Queen | .... | Sand | Good |
| Grayburg | .... | Dolomite | Good |
| San Andres | 1,200 to 1,500 | Dolomite | Good |
| Yeso (Clearfork) | 2,200 | Dolomite shale and sand | Poor |
| Abo | 1,000 | Dolomite | Fair |
| Wolfcamp | 400 to 600 | Limestone | Good |
| Pennsylvanian | 2,000 to 3,000 | Limestone | Good |
| Siluro-Devonian | 200 to 600 | Dolomite | Excellent |
| Ordovician (Ellenburger) | 300 to 400 | Dolomite | Good |

**Southern Eddy County (Delaware Basin)**

| Formation— | Approx. thickness (ft.) | Reservoir — Type | Reservoir — Per cent |
|---|---|---|---|
| Delaware Mtn. (Bell Canyon) | 1,000 | Sand | Fair to good |
| Delaware Mtn. (Cherry Canyon) | 1,000 | Sand | Fair to good |
| Delaware Mtn. (Brushy Canyon) | 1,000 | Sand | Fair to good |
| Bone Springs Type (Yeso, Abo, Hueco, Penn.) | 1,000 to 3,000 | Limestone | Fair to part |
| Siluro-Devonian | 300 to 800 | Dolomite | Excellent |
| Ordovician (Ellenburger) | 300 to 600 | Dolomite | Good |

CHAVES and Eddy counties in southeastern New Mexico (see Fig. 1) not only have extremely favorable wildcat areas for commercial accumulation of petroleum, when petroleum source bed and reservoir bed requirements are considered and applied to exploration, but also that these areas are practically unexplored by the drill.

These counties have most of the known types of traps, like faults, anticlines, domes, stratigraphic traps, and combinations of each scattered throughout the area, but some of these traps are located in areas of low-percentage favorability for petroleum accumulation, and some are in areas of high-percentage favorability for petroleum accumulation, depending upon the amount and type of stratigraphic section, or rather the amount and type of source and reservoir beds.

Everyone looks for a structural trap. Let us combine source and reservoir, in addition to trap requirements, in our review of the petroleum possibilities of Chaves and Eddy counties and consider the area in the light of percentage of favorability for petroleum accumulations.

**Regional background . . .** Chaves and Eddy counties, combined, probably offer some of the greatest changes in geological environment occurring in the Permian basin. During early times (Ordovician, Silurian, and Devonian) the epeiric seas encroached from the south and east and apparently banked up against an old shore line which occupied a position roughly marked by a line just west of the northern extension of the Huapache monocline and the Y-O fault trace, swinging just east of Roswell, extending to the north to the Chaves County line, and following the county line to the east and southeast into the Crossroads area of Lea County. This sea deposited pre-Pennsylvanian beds (Silurian, Devonian, Montoya, Simpson, Ellenburger, etc.) which have produced prolifically elsewhere in the Permian basin in New Mexico and Texas.

Following deposition of the pre-Pennsylvanian beds, a period of non-deposition occurred during which the beds were subjected to folding and mountain building creating structural conditions and faults, etc. Secondary porosity caused by leaching and solution action in dolomite, ground-water action, and fracturing, etc., have all combined with existing primary porosity in the beds to create some first-class reservoirs.

It was upon this hammocky ter-

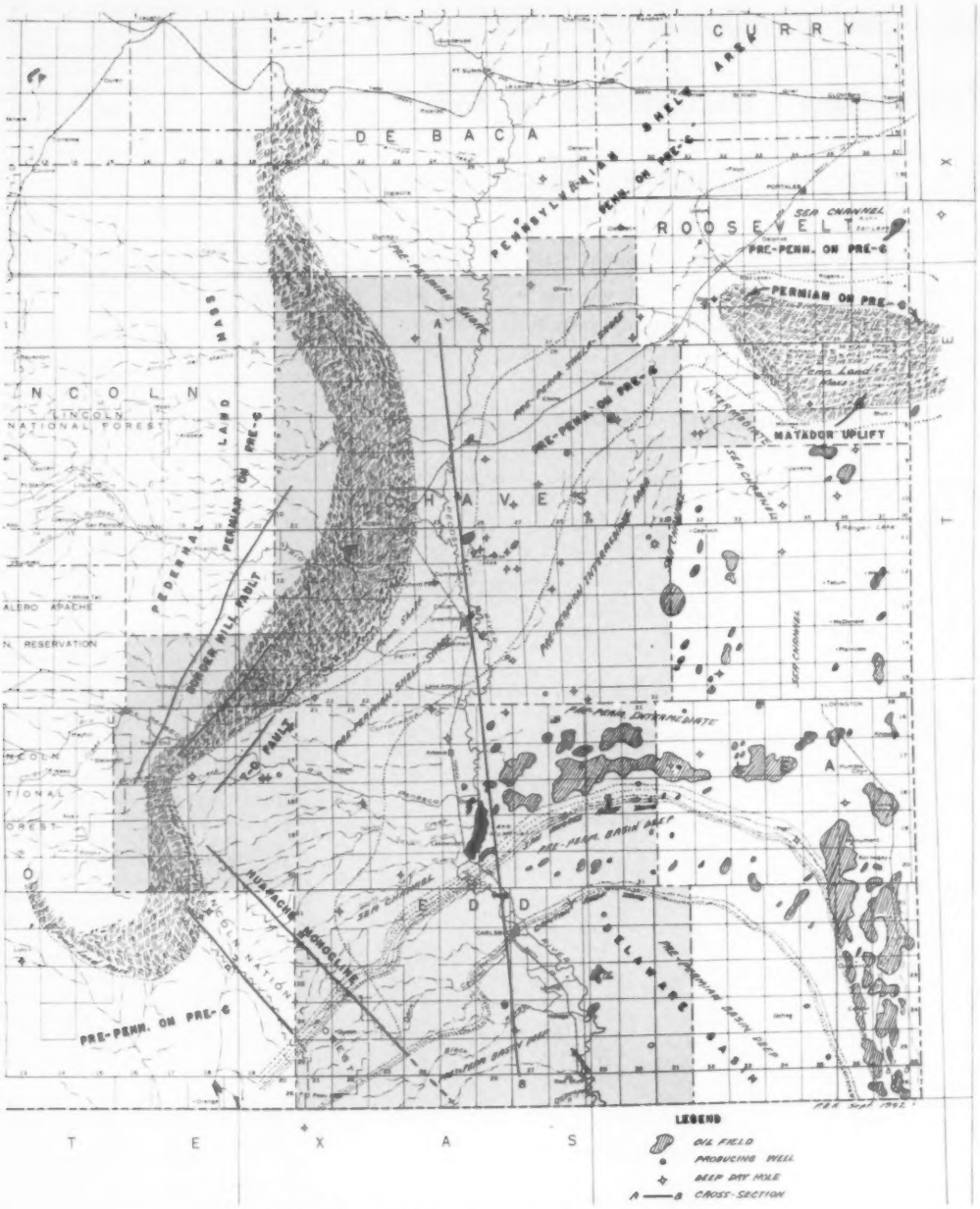



Fig. 1—Map of Eddy and Chaves counties and the surrounding areas.

rain with valleys, ridges, knobs, and hills that the Pennsylvanian seas encroached and deposited a great variety of clastics, reefoid, limestones, and shales, blanketing the old existing land forms and filling the valleys and finally leveling off the entire basin. The shore line on the west was essentially the same as during pre-Pennsylvanian time, formed by what has been called by some operators as the Pedernal land mass or Pennsylvanian land mass where no Pennsylvanian was deposited.

This land mass, existing above sea level extended north along the west side of Chaves County as far as Guadalupe County, creating along its flank to the north, a Pennsylvanian shelf area of alternating clastics and anhydrite with earthy limestones, beginning at the northern line of Chaves

County and extending into De Baca, Curry, and Guadalupe counties. In this area Pennsylvanian rests on pre-Cambrian.

The Permian formations were deposited upon the Pennsylvanian strata with little or no great change in character. To the north of the Eddy-Chaves county line, strong changes in character of the Permian seas took place, creating the various formations which are distinctive, like Abo, Yeso, and San Andres, while in the reefing area in north Eddy County, reefs were being deposited, and further to the south in Delaware basin, a tremendous sand section was being deposited, creating very complex facies changes during Permian time. It is along the reefing zone that the shallow Permian production was found 30 years ago in Eddy County.

So, one can easily see the position of Chaves and Eddy counties, New Mexico, in an environmental past which has created both basin deep and shore-line deposits, together with intermediate features like reefing and barrier type of deposition. (See Fig. 2.)

**Reservoir possibilities . . .** The generalized cross-section (Fig. 2) shows the lateral extent of all the strata to be found in Eddy and Chaves counties. Table 1 indicates the formations in the two counties, and the possibilities of reservoir conditions existing in each formation.

**Chaves County reservoirs . . .** Chaves County offers little in the way of inducement to exploration for shallow Permian production, because some of the upper Permian reservoir beds which produce in Eddy County grade into clastics and evaporites to the north in Chaves County. The San Andres which reefs and has porosity in northern Eddy County becomes sandy and anhydritic in the upper portion and dense and tight in the lower portion in Chaves County. This change applies to Clearfork (Yeso) and Abo as well, but the Wolfcamp (Hueco) or (Permo-Pennsylvanian) extends north across Chaves County with promise of reservoir conditions and production. The intermediate area in the case of the Permian extends across northern Eddy County, while the Permian shelf-shore phase exists to the north in Chaves County. (See Fig. 1.)

Chaves County offers considerable reservoir zones, beginning with the Wolfcamp Pennsylvanian and extending to the pre-Cambrian basement at fairly economic depths. The depth to the Wolfcamp or Permo-Pennsylvanian in Chaves County ranges from about 3,500 ft. on the flanks to about 7,000 ft. in the southern part of the county with pre-Cambrian ranging from 6,000 to 12,000 ft. or more. The reconstructed environmental conditions for pre-Permian in Chaves County are shown in Fig. 1. The pre-Permian was somewhat restricted. The shore lines outline the county on the north. The basin deep existed in a sea channel form in the northern part of the county, broadening out into a basin deep area to the south. The intermediate area lies between the basin deep and the shore line.

**Chaves County exploration . . .** Fig. 1 shows the location of all pre-Cambrian tests to date in Chaves County. While there have been several wells drilled near shore and in the channel there have been comparatively few drilled in the intermediate area. Some of these wells drilled in the intermediate area have been drilled on seismograph structures shot on a zone in the Pennsylvanian, which the drill proved nonexistent in the deeper formations. In the writer's opinion, the intermediate zones in Chaves have not been adequately tested.

The following is an environmental classification of Chaves County and Roosevelt County production (see Fig. 1):

| Producing area— | Township | Producing zone | Basin environment |
|---|---|---|---|
| Lightcap pool | 8s-30e | Mottled dolomite | Shelf-shore (pre-Permian) |
| Magnolia Brown | 7s-34e | Sand conglomerate | Shore phase (pre-Permian) |
| Magnolia O'Brien | 9s-28e | Mottled dolomite | Shelf-shore (pre-Permian) |
| Chisum field | 11s-27e | Mottled dolomite | Shelf-shore (pre-Permian) |
| Caprock field | 12s-31e & 32e | Sand | Shelf (Permian) |

The Lightcap, O'Brien, Brown, and Chisum areas are all located near shore and produce high-gravity oil and distillate. The producing areas are small and in the case of the Brown production, it implies migration into a shore-line sand conglomerate which lies not very far from its source of quartz rock. These accumulations indicate small local petroleum source beds or the tail end of long-range migration into shore-line porosity pinchouts or structural traps. The improved favorability areas for larger accumulations would be toward the deeper water or basinward from these shore-line indications in the intermediate, as shown in Figs. 1 and 2.

Further evidence of petroleum pointing toward small local source beds or tail end of long-range migration into shore-line porosity, is the Apache Noble test in 18-4s-27e, where a gas sand in the Pennsylvanian was tapped and blew down completely within a couple of days. There is certainly evidence of petroleum in the area, but now it certainly appears more practical to look for it nearer the source areas where more section is likely to produce, and where commercial quantities are more likely to be found.


**THE AUTHOR**

**Phil D. Helmig is chief geologist for Malco Refineries, Inc., at Roswell, N. M. He was formerly petroleum geologist for Gulf Oil Corp. A 1937 graduate of University of Oklahoma, Helmig took his graduate work at University of Missouri. He has practiced geology in Rocky Mountain area, the Williston basin, Illinois basin, Indiana, Kentucky, the Permian basin, and Canada. Most of his experience, however, has been in the New Mexico portion of the Permian basin.**


In southern Chaves County, the intermediate zone and basin deep zone for pre-Permian beds are practically untouched. Wells that have been drilled in these zones have later been found to be offstructure in most cases. Improved seismic work, combined with derivative aeromagnetics to determine the basement relief and the overlying sediment structure in the intermediate area and basin deep area, is definitely required to successfully explore Chaves County's most favorable areas.

### Eddy County Reservoirs

Outside the present shallow Permian production in northern Eddy County, the greatest potential shallow Permian production area is the Delaware basin region. In Texas the top of the thick Delaware sand section produces in Wheat field, Tunstill and Mason fields, and other shallow fields in the basin. In New Mexico, newly discovered Malaga field produces from the same zone at 2,700 to 2,800 ft. The old Seven Rivers field to the west of Malaga also produces from the same zone. The vast area in which the sand exists with porosity or reservoir characteristics covers most of southeastern Eddy County. New wells are picking up additional pay locations in the area. (See Fig. 1.)

Significant also of the lower Permian beds in the Delaware sand section is the drill-stem test on Richardson & Bass 1 Cobb-Federal deep test now drilling, located in 23-20s-31e in Eddy County, which gave up oil from the lower Delaware section, indicating that it is possible for lower zones in that thick Delaware sand section to produce in the Delaware basin.

Similarly, the drill-stem test on Sun Oil Co. 1 Harper-Federal, deep test

# Three Environmental Zones in Sedimentary Basin

ALTHOUGH very little is known about source beds of petroleum, a few pertinent ideas are creeping into prominence in regard to them, based on continued study and research. In a sedimentary basin or an area which has been covered by an epeiric sea, there are usually three environmental zones:

1. **The Basin Deep** or sea channel area below wave base where there is little disturbance and deposition of fine sediments by settling or precipitation takes place.

2. **The Intermediate Area** lying between the Basin Deep and the Shelf-Shore areas where both clastics and carbonates mingle, lying near wave base.

3. **The Shelf-Shore Area** or strand-line area above wave base where considerable disturbance and clastic deposition take place on the shelf and near the shore line.

The greatest petroleum source-bed manufacturer probably is the basin deep sea area, because there is no oxidation in the deep water, no scavenger animals present to remove organic material like those existing in the shelf-shore sea environ, nothing to alter the abundance of accumulation of organic material like plankton, nekton, and other myriad sea life, which continually falls to the bottom with fine sediment. Later, heat and pressure of overlying sediments, folding, plus action of certain bacteria are generally accepted as providing natural distillation from the waxes and fats into hydrocarbons, provided space is available in the rock to allow the alteration to liquid and/or gas.

Space for natural distillation may be provided in the basin deep area itself by structural conditions causing erosional porosity by action of ground water on an uplifted surface or by primary porosity caused by certain depositional phases. The basin deep, however, is generally composed of dark-colored beds, dense and tight black shales, and dark limestones with little or no porosity because of their fine-grained characteristics and undisturbed environment. The intermediate area on the other hand is usually an area of great porosity caused by reefs, abundance of teaming life with oxidation and scavenger animals, continual disturbance at or above wave base, secondary alteration and recrystallization occurring in the deposits which are usually a combination of carbonates and clastics. The intermediate area is a reservoir area, much more so than the basin deep area. The shelf-shore area is also a reservoir zone because of its clastic deposition and environmental disturbances above wave base, but it is more restricted to certain beds of clastic depositives.

In general, we now have outlined probable areas of source and reservoir. It cannot be said that source beds do not occur in all three zones, but probably the greatest source area is the basin deep. It cannot be said that reservoir space does not occur in all three zones, but it is apparent that the most important reservoir is the intermediate area.

As space is a requirement for commercial accumulation of petroleum, the highest percentage of favorability for petroleum accumulation would necessarily be where source and space get together in as many formations as possible. This area is the intermediate zone, or zone of probable highest favorability for petroleum accumulation. It may be wide in places and narrow in others. Regionally, it roughly parallels the shore line, sometimes close in and sometimes far out, depending on water depth, which is based upon the steepness of the shore dipping toward the basin deep. It lies in a different zone and has a different character for each formation or sedimentary environment condition, but in general, it will occupy a regional zone roughly paralleling the periphery of the basin.

So, we see a general reconstruction of possible past action and environs which may have caused petroleum accumulation. Movement of petroleum generally is believed to move from the source rock updip toward the shelf and shore line or upward wherever space permits. Its migration is impeded only by obstacles placed in its path like traps, stratigraphic or structural, which cause accumulation in a particular location. The size of the accumulation apparently depends upon the size of the source area, the nearness of the reservoir trap to the source area, and the space available or the size of the trap and the thickness, porosity, and permeability of the reservoir bed or beds.

Good reservoir rocks with complete and satisfactory traps in the shelf-shore area may be barren because petroleum in migration never reached the zone, being halted and trapped between the source and the clastic shore-line phase of deposition.

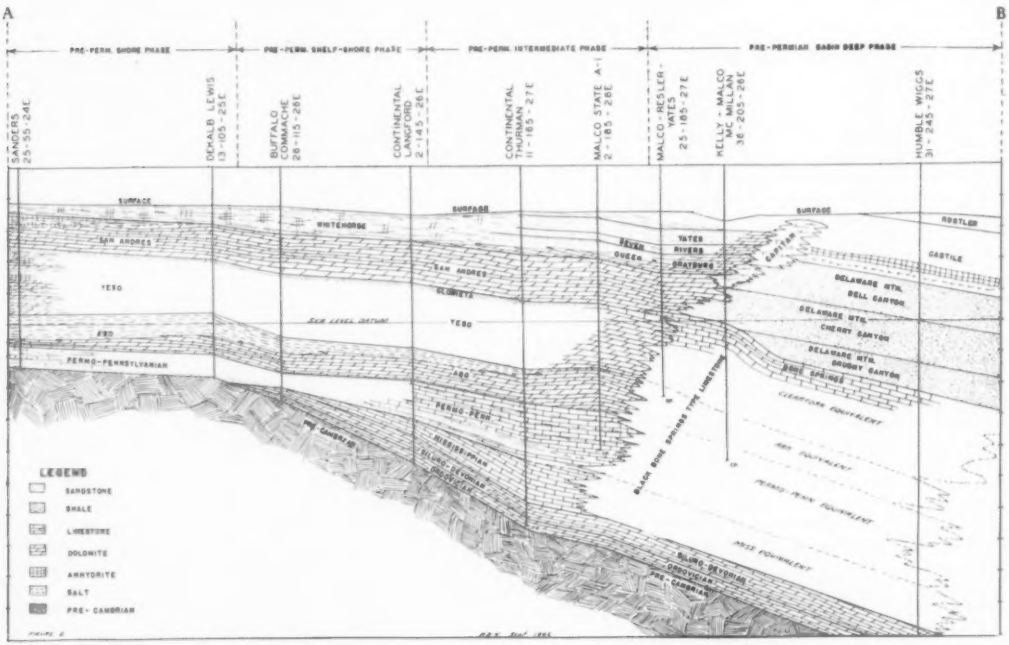
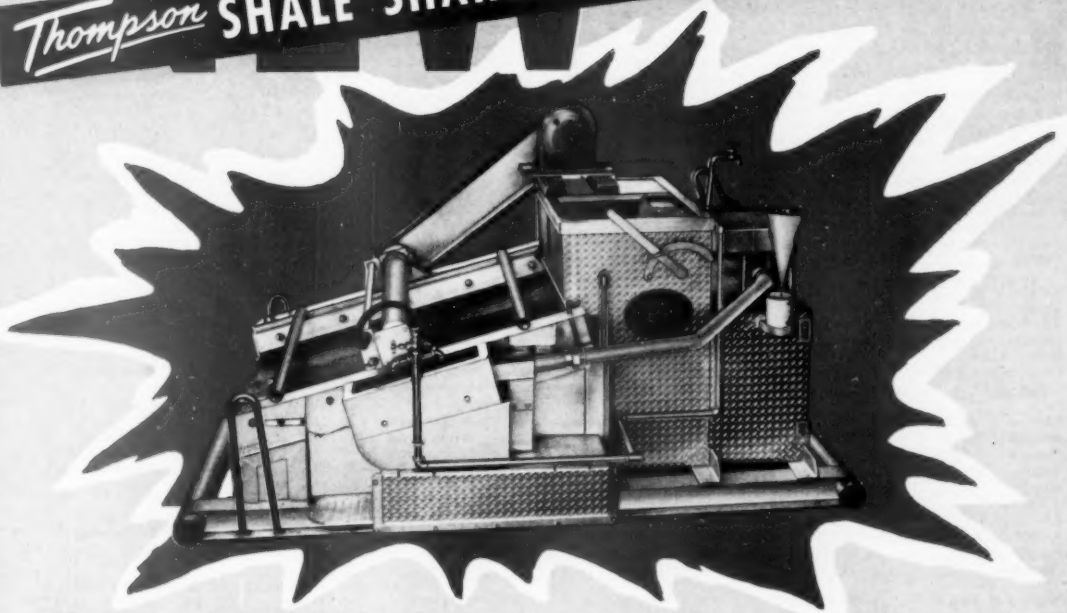



Fig. 2—CROSS SECTION of formations under Eddy and Chaves counties. (See Fig. 1 for location of A-B line).

# NEW

## Thompson SHALE SHAKER & SAMPLE MACHINE



**NOW — after years of engineering, development and field testing — it's ready for you!**

Thompson, leading manufacturer for many years of the Famous Self-motivated Rotating Shale Separator, now introduce a new Vibrating-type SHALE *SHAKER*. This Thompson SHALE SHAKER has been proven in the field and many of them are operating throughout Oklahoma and Texas with complete satisfaction. Many NEW and IMPROVED FEATURES — some exclusively Thompson — spearpoint this highly efficient machine. Check these advantages:

Here the operator is taking a sample from Sample Machine exclusive on NEW Thompson Shale Shaker.

Above is rear view of NEW Thompson Shale Shaker showing convenient wash basin and tool cabinet.

### EXCLUSIVE FEATURES...

- **SAMPLE MACHINE for easy sample taking**
- **LIFTING BALLS for easy pick-up**
- **WASH BASIN for cleaning tools and hands**
- **STATIONARY WATER SPRAY for washing screen**
- **SAMPLE, SAMPLE BAG, AND TOOL CABINET**

### Other Advantages...

- By-pass built in mud box
- Screen bed sets on Rubber Mounts
- Extra Strong Screen Bed
- Coated Against Corrosion and Rust
- All heavy Steel — welded construction
- Takes Heaviest Mud Flow
- Uses Electric, Steam, Gas Engine or Oil Drive
- HIGHLY ECONOMICAL OPERATION

VISIT OUR BOOTH — NO. 22
PERMIAN BASIN OIL SHOW

**Thompson TOOL CO.**
IOWA PARK, TEXAS

THE NEW
WILSON ATLAS RIG

Rated Capacity
10,000 ft. — 4½" Drill Pipe
12,000 ft — 3½" Drill Pipe

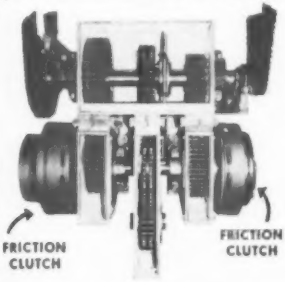
# Wilson Rigs Cut Drilling Costs!

In today's Wilson rigs, Advanced Engineering makes it possible for the contractor to cut his overall Drilling Costs and make money in times of high labor and operating costs. Wilson rigs have been engineered for greater efficiency, faster operation plus a maximum of safety to crew. Downtime due to costly repairs has been reduced to an absolute minimum due to this same Advanced Engineering and to faster servicing from the Wilson Organization. A Wilson Rig continues to make money many, many years after it has paid for itself.

*Compare* FEATURES — QUALITY — COSTS

## BIG FEATURES
### OF WILSON RIGS!

★ **ALL FRICTION CLUTCH-CHAIN DRIVE TRANSMISSION** offers smoother, more efficient, more economical operation . . . plus less downtime due to trouble!

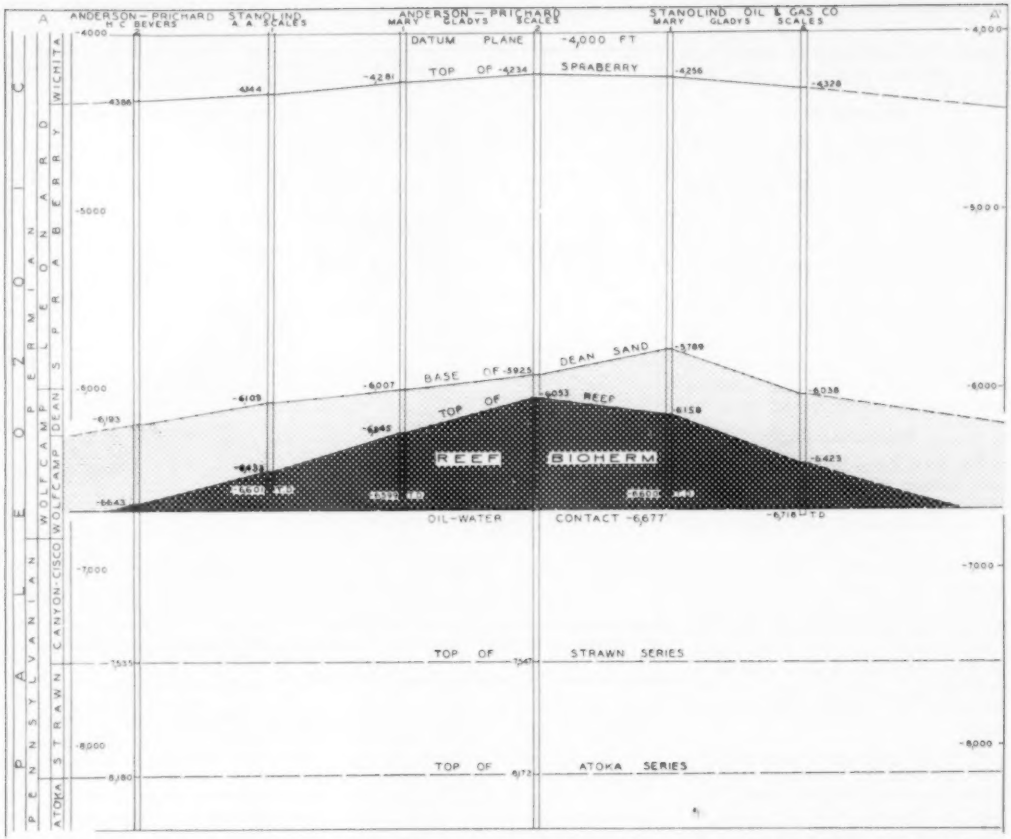



★ **AIR-OPERATED FULL VISION MASTER CONTROL PANEL** for added efficiency of Driller . The best Control arrangement of any rig!

★ **SECTIONAL BOX-TYPE COMPOUND** to assure POSITIVE ALIGNMENT of engines at all times . . . reduces rigging up time!

★ **AIR-TUBE DISC CLUTCHES** — The World's Best — on all drives . . . provide faster operation!

**Wilson MANUFACTURING CO., Inc.**
WICHITA FALLS, TEXAS




**PROLIFIC POOL: West-east geological cross-section A-A' of Wellman field, Terry County, Texas, showing development of reef bioherm in Wolfcamp (Permian) series. (Fig. 1). See Fig. 6 for line of section.**

## LOWER PERMIAN REEF BIOHERMS

# Wellman Reef: 2 Million Barrels in 2 Years

### Wolfcamp dolomite structures objective of major seismic campaign since 1950 in the northern end of the Central Basin platform.

**by Joseph A. Kornfeld***
District Editor

WELLMAN field at the northern end of the Central Basin platform in West Texas has produced about 2,000,000 bbl. of high-gravity oil since its discovery about 2 years ago.

Today, there are 27 oil wells on production from one of the thickest and richest reef sections ever logged in the West Texas basin. Gross pay sections in the Wolfcamp series range up to 820 ft. above the field water table. Four rigs are still active in delineating the periphery of this ovular-shaped reef, which may cover 1,400 acres on completion of development.

*Presented before the International Geological Congress, nineteenth session, Algiers, Algeria, Sept. 8-15, 1952.

### High Exploration Risks

The exploration risks involved in the search for steeply dipping reefs such as Wellman is exemplified in the toll of 18 dry-reef wildcats that were drilled in this area during 1951; of this total, 12 were drilled in Terry County and 6 in Hockley.

Geophysical exploration in search for reefs in the north end of the Central Basin platform is reflected in the high level of activity in these counties during 1951. Terry County was the second most active county in the Texas portion of the basin with 237 crew weeks of seismic activity. Hockley had 127 seismic crew-weeks, Dawson 165, and

Gaines 192 crew-weeks of seismic activity. Wellman pool is a seismic discovery.

### Oil Allowables

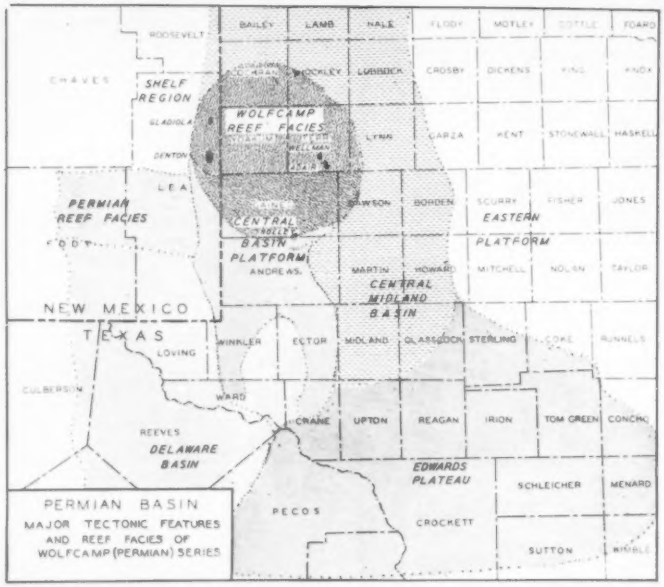
After discovery on July 9, 1950, Wellman operated under a discovery allowable of 200 bbl. per day for the first five wells. On completion of the fifth well, allowable was cut to 162 bbl. per day, subject to shutdown days. On expiration of discovery allowable on January 17, 1951, Anderson-Prichard engineers obtained an increase in basic allowable to 300 bbl. per day per well subject to shutdown days. The total field allowable for the month of October 1952 is 8,100 bbl. per month or 6,010 bbl. on a calendar-day basis.

### Regional Geology

The West Texas basin is divided into four distinct geologic features: (1) the Midland basin, (2) the Delaware basin, (3) the Eastern Shelf, and (4) the Central Basin platform (Fig. 2).

During the Wolfcamp epoch of basal Permian time, reef-type dolomite and limestone including red shale and detrital material were deposited over the Central Basin platform. Contemporaneously, very fine-grained sandstone and dark gray siliceous shale were deposited in the Midland and Delaware basins.

In the northern part of the Central Basin platform, 13 Wolfcamp reef bioherms have been discovered since 1950. Four of these reefs have been found on the West Texas side and the remainder in Lea County, New Mexico. A total of 140 oil wells have been completed from these reservoirs at depths ranging from 8,150 to 10,118 ft. Their aggregate crude-oil production exceeds 400,000 bbl. of high-gravity oil per month.




**REGIONAL GEOLOGIC MAP of the Permian basin showing major tectonic features and generalized position of reef facies of Wolfcamp (Permian) facies at northern end of Central Basin platform. (In part after Sidon Harris.) (Fig. 2.)**

The subsurface geology of these reef bioherms and biostromes has been gradually revealed by the drill through electric and radioactivity logging surveys, diamond-core recoveries and core analyses, and descriptions. The data uncover a new chapter in the study of Permian reef structures in the West Texas basin.

Originally, these reef structures were not sought directly. Many were found accidentally and were penetrated in drilling to deeper objectives in search of Ordovician and Devonian limestone oil reservoirs. Frequently these Wolfcamp reefs were developed on the flanks of Lower Paleozoic folds and it is common practice to drill twin wells in eastern New Mexico, to obtain single-hole completions in the Wolfcamp reef as well as in the Ordovician and Devonian reservoirs. However, there are notable exceptions where Wolfcamp reef oil production has been discovered on structural terraces in the pre-Permian formations. A striking example of the latter type has purposely been selected to illustrate the principles of structural geology involved and to evaluate limited lithologic data from cores.

Paleozoic reefs in western and northern Texas are known in an area of 50,000 sq. miles according to Richardson.[1] They exhibit a great variety of shapes and a wide stratigraphic range in their periods of growth. The reefs were formed far from major shore lines in an epicontinental sea. While some of the reefs adjusted themselves to sharp eminences created by early Pennsylvanian uplifts, other reefs may have indirect and offset relationships to gentle pre-Pennsylvanian uplifts and flexures.

Wolfcamp reef structures are principally bioherms. Structural contour maps on top of the reef body reveal generally elongate types; the major axis may attain a diameter of as much as 3 miles although this is uncommon. Reef buildup may be asymetric and gross pay sections of as much as 820 ft. above the oil-water contact has been noted in one reef, Wellman field in Terry County, Texas, the case history to be discussed.

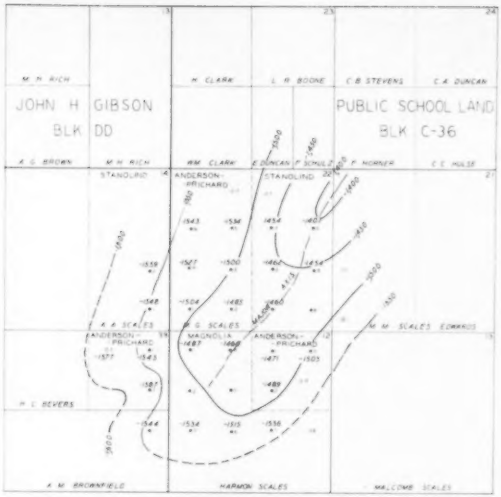
Flow rates of as high as 100 bbl. of oil per hour from the Wolfcamp reef have been observed for short periods in Wellman field where the lithology is vuggy, fractured dolomite. This is unexpected in view of the tight matrix which exhibits porosities of from 3.05 to 7.11 per cent and air permeabilities of from 1.9 to 58 md. Confirmation of the high productive capacities is indicated from field productivity index tests which reach as high as 1.9 bbl. of oil per day per pound pressure drop observed while producing the well at a

## Reef Nomenclature*

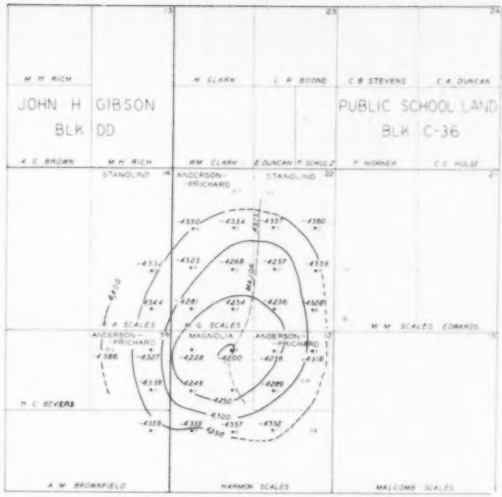
**Bioherm:** an accumulation of the secreted hard parts of sessile types of primitive invertebrates and plants such as corals, bryozoans, crinoids, sponges, algae, et cetera, which accumulation is greater than the surrounding contemporaneously deposited sediments, thus giving rise to mounds, ridges, or reefs . . .

**Biostrome:** an accumulation of the same or similar sort of material as a "bioherm" or "reef," but the accumulations are in layers or strata which are no greater in vertical dimensions than the contemporaneously deposited surrounding sediments. . . .

*Adapted from Link, Theodore A., "Theory of Transgressive and Regressive Reef (Bioherm) Development and Origin of Oil:" Bull. A. A. P. G., Vol. 34, No. 2, (February 1950) page, 263.




**TOP OF SAN ANDRES structure of Wellman field shows only 10 ft. of structural closure. (Fig 3).**




**TOP OF SPRABERRY structure of Wellman field shows 186 ft. of structural closure. (Fig. 4).**

daily oil rate of 1,968 bbl.; this phenomenon occurs under a highly effective bottom-water drive. One of the most prolific Wolfcamp reefs in the Permian basin, Wellman has 27 oil wells on production restricted to a calendar-day average of 6,010 bbl. for the month of October 1952.

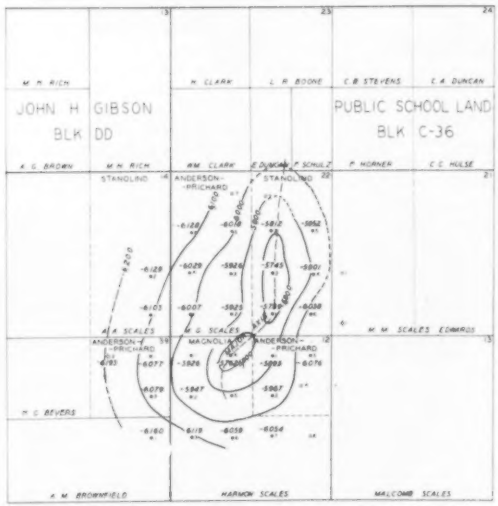
### Reef Site

The Wellman reef was deposited on a terrace in the Pennsylvanian seas. Fig. 1 portrays the level attitude of the base of the reef built on a Pennsylvanian terrace.

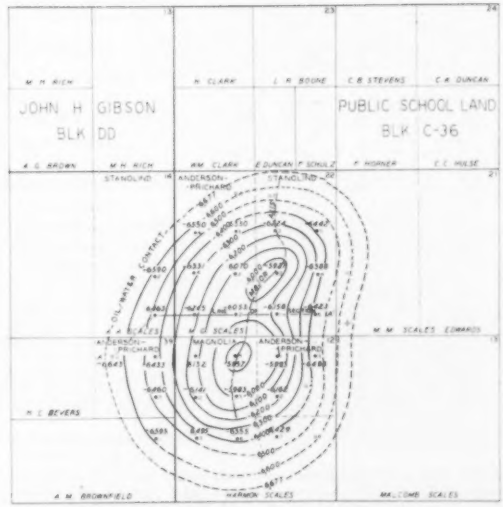
Of the two deep tests that reached the Atoka series of Pennsylvanian age, there is relative minor difference in subsea position with reference to a horizontal distance of 3,960 ft. which separate the deep tests. This comparison is tabulated in Table 1.

Thinning of the Strawn-Atoka interval of 20 ft. from the west edge well to the crest well described may be due to regional tilting in pre-Strawn time. All available evidence points to the absence of a deep-seated fold underlying the Wolfcamp reef bioherm in Wellman field.

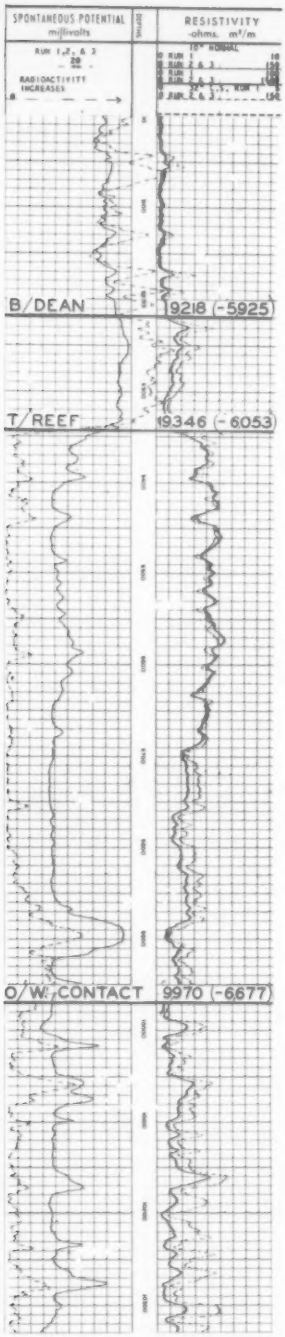
**Pennsylvanian analogy . . .** The occurrence of reef bioherms on terrace sites is not restricted to those of Wolfcamp age. A study of a cluster of Marble Falls (Pennsylvanian) reefs in western



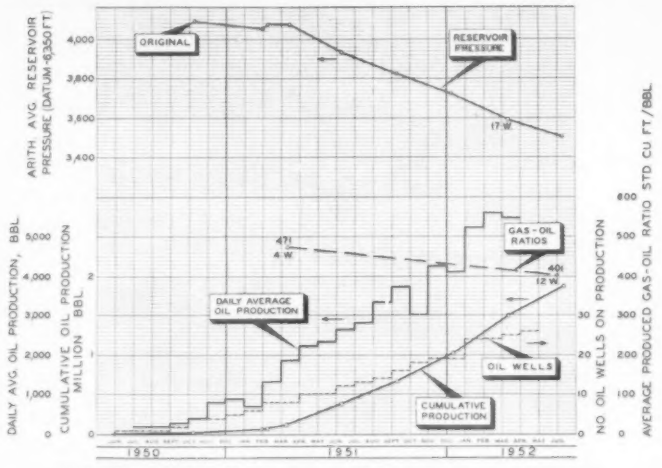

**BASE OF DEAN structure of Wellman field shows 448 ft. of structural closure. (Fig. 5).**




**TOP OF WOLFCAMP REEF structure of Wellman field shows 786 ft. of structural closure. (Fig. 6).**




**REEF BUILD-UP** is reflected in electric and radioactivity logs of Anderson-Prichard Oil Corp. 2 M. G. Scales, SE SW 22, C-36, PSL Sur. Note shale-break 60 to 90 ft. above oil-water contact.




**RESERVOIR PERFORMANCE** chart for Wellman field, Terry County, Texas.

**TABLE 1—STRUCTURAL COMPARISON OF WELLS PENETRATING WOLFCAMP REEF**

| Formation— | West-edge well* | Crest well† | Difference |
|---|---|---|---|
| Top of Strawn | —7,535 | —7,547 | 12 |
| Top of Atoka | —8,180 | —8,172 | 8 |

*Anderson-Prichard 2 H. C. Bevers, NW NE Sec. 39, Blk. DD. †Anderson-Prichard 2 M. G. Scales, SE SW Sec. 22, Blk. C-36.

Comanche County, Texas, reflects an analogous condition in that the group is deposited on terraces which occur on the eroded Ellenburger formation from which the Barnett (Mississippian) shale has been removed by truncation and erosion.

### Major Structural Concepts

Reef structures of the bioherm type exhibit at least two major structural relationships as cited by Agnich:[2]

1. Differential compaction in the shales above the reef indicating folds in the shallower beds.

2. Diminution of the magnitude of folding towards the surface of the earth.

In Wellman field, marked compaction is evident in the interval between the base of the Dean sand and the top of the Wolfcamp reef. This interval thins from a maximum of 490 ft. at the northeast edge of the field (Stanolind 5 Mary G. Scales, SE NE 22, Blk. C-36, PSL) to only 95 ft. at the crest of the structure (Magnolia 4 Harmon Scales, NE NW 12, Blk. C-36, PSL). The effect of compaction referred to is portrayed in Fig. 1.

Agnich[2] has pointed out that the amount of compactional folding over a reef varies considerably and that this condition is dependent upon the vertical extent of the reef and the nature of off-reef materials. Thus the effect of burial on sands and limestones is very slight.

Where the off-reef sediments are predominantly shales, a high degree of structural folding may be expected to be reflected above the reef body due to differential compaction, since shales respond readily to compaction. Generally, all other factors considered equal, the greater the depth to the reef, the greater the amount of compaction.

**Diminution of folding...** The second feature of reef structure cited is the diminution of folding as the surface of the earth is approached. This condition is portrayed by a series of structure maps shown as Figs. 3, 4, 5, and 6.

**TABLE 2—STRUCTURAL EFFECTS OF WOLFCAMP REEF AS REFLECTED ON VARIOUS PERMIAN MARKERS**

| Formation— | Highest structural point (ft. subsea) | Lowest structural point (ft. subsea) | Maximum structural relief (ft.) | Maximum structural closure (ft.) |
|---|---|---|---|---|
| Top of San Andres* | —1,407 | —1,577 | 170 | 10 |
| Top of Spraberry | —4,200 | —4,386 | 186 | 186 |
| Base of Dean sand | —5,745 | —6,193 | 448 | 448 |
| Top of Reef | —5,857 | —6,643 | 786 | 786 |

*Correlation point near the top of the San Andres lime as indicated on electric well logs.

# Baash-Ross

## "OK" OVERSHOT

*Circulating and Releasing Type*

**It's Simple!**

*No complicated operating parts*

Spring-Loaded Slips
Pack-Off Rubber
Packing Gland (also available in milling type)
Flush Guide (also available in milling type)

**It's Quick!**

*Simply lower it over fish and pull*

This is the fishing tool to keep handy for those unexpected emergencies when you want to go in, catch a fish with minimum delay, and get out before the tool becomes wedged by cuttings and cavings. Many operators keep it standing in the rig for immediate use on twist-offs, stuck pipe and other fish that can be recovered with an overshot type of action.

**It's Adaptable!**

*Single or multiple bowls—many accessories*

**OPERATION** of the "OK" is simplicity itself. Just lower it over the fish—and pull. The spring-loaded slips expand automatically as the tool passes over the fish, then wedge down against a tapered seat to give a bulldog-grip as the tool is raised. *It's quick, simple, fool-proof!*

**RELEASE.** in case the fish can't be moved, is obtained by simply rotating the tool as it is slowly raised. The spiral-cut slip wickers then unscrew from the fish, freeing the Overshot for withdrawal.

**FULL PACK-OFF** permits high-pressure circulation through the tool—and the pack-off is located *below* the slips to assure a pressure-tight seal around the fish whenever the slips have a grip.

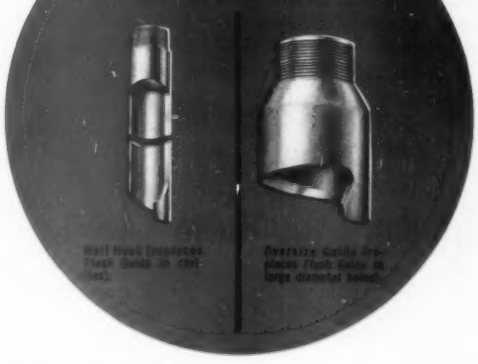
**TWO OR MORE** "OK" bowls can be connected together to make a single overshot that will fit different diameters (depending upon the number of bowls connected together).

**FOR TWIST-OFFS** and other fish with irregular tops, milling shoes and glands can be placed in the "OK" for milling over the fish.

**OVERSIZE GUIDES** and Wall Hooks are also available to replace the regular "OK" Guide Shoe. These simplify catching fish in large holes or cavities.

**SOLD** in both domestic and overseas fields. Also rented domestically.

"OK" Overshots are available in various outside diameters to catch any size fish up to 8⅛" O.D.—in both right and left-hand types. Larger sizes can be furnished on request.




*Let our nearest Baash-Ross representative give you complete details on the many advantages built into "OK" Overshots. Or write direct!*

**Available Through Leading Supply Stores.**

**Baash-Ross**

**TOOL COMPANY** *Our 32nd year*

GENERAL OFFICES: 5512 SO. BOYLE AVE., LOS ANGELES 58
OKLAHOMA CITY • HOUSTON 20 • ODESSA • CASPER
*Export Offices:* 11 W. 42nd St., New York 36

## *One idea from one mind..* **can make money for many**

Many an essential piece of equipment or a service in use today was born a doodle on the sketch pad of creative genius. This genius may be a toolpusher whose years of experience in the field inspired his idea; he may be a trained engineer; he may be top brass with a major company . . . but once its practicability has been proved, his idea becomes a significant potential in the cycle of supply and demand. Development and perfection of this idea rests with the manufacturers or service companies who pour dollars and time into perfecting an end result. Its earning power rests with its widespread distribution by the suppliers. Thus do many forces combine in translating one idea from one mind into a multimillion-dollar working partner of the world's greatest industry.

P.E.S.A.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

PARTNERS IN PETROLEUM PROGRESS

Petroleum Equipment Suppliers Assn.

The decrease in folding with height above the reef body is described in Table 2.

**Top of reef . . .** The surface of the Wellman Wolfcamp reef is a twin dome exhibiting a **known** structural closure of 786 ft. above the lowest control point. However, since the oil-water contact has been revealed by coring to be at a subsea elevation of 6,677 ft., the known productive closure is 820 ft.

The asymetric shape of the reef is reflected in steep east dips of 495 ft. in a horizontal distance of only 1,320 ft. Anderson-Prichard Oil Corp. 1 Harmon Scales on the crest of the structure found the top of the reef at 5,993 ft. subsea while its east offset, same interest's 3 Harmon Scales, did not encounter the reef until a subsea elevation of 6,488 ft. was reached.

Stanolind Oil & Gas Co. 2 A. A. Scales, NE SE NE 14, Blk. DD, John H. Gibson Survey, found no water in drilling to —6,672 ft. The oil-water contact, however, was later cored by same interest's 5 M. G. Scales, SE NW NW 22, Blk. C-36, PSL. The contact was cut at —6,677 ft. in coring to —6,681 ft., total depth.

**Base of Dean sand . . .** Essential features of the Wolfcamp reef structure are reflected in the structure on the base of the Dean sand. Consider the structural closure of 448 ft. on the base of the Dean sand with 786 ft. measured on top of the Wolfcamp reef.

An unusual feature of the present attitude of the base of the Dean sand is the fact that the highest structural point —5,745 ft. directly overlays the north closure of the top of the reef. On the other hand, a lower structural point on the base of the Dean logged at —5,762 ft. directly overlays the **highest** subsea point of the top of the reef. Post-Wolfcamp pre-Spraberry faulting over the crest is postulated as the explanation of this unusual discordance. An alternative explanation would consider post Wolfcamp pre-Spraberry regional tilting due to basin-filling in the Midland basin to the southeast of the Wellman feature.

**Top of Spraberry . . .** Structural closure on top of the Spraberry formation amounts to only 186 ft. compared with 786 ft. on top of the Wolfcamp reef. Yet the quaquaversal character of the dome persists at this high position in the geologic column. However, a single dome now replaces the twin-dome feature which carried from the Wolfcamp reef up into the base of the Dean sandstone layers.

Structural expression of the Wellman Wolfcamp reef on top of the Spraberry datum appears as a broad crest extending over a diameter of ¾ mile.

**Top of San Andres . . .** Folding in the Permian sediments over the Wellman Wolfcamp reef persists as high as the San Andres and may be reflected in even shallower beds. (The contour datum is an electrical-log feature which occurs near the top of the San Andres.)

Structure on this datum has been reduced to a southwest-plunging terrace; the amount of structural closure has been reduced to only 10 ft.; the locus of this closure directly overlies the crest of the reef structure (Fig. 3).

**TABLE 3—CORE-ANALYSIS SUMMARY OF WELLMAN REEF, INTERVAL FROM 9,734.0-9,755.0 FT. (11 PLUGS ANALYZED)**

(Lithology: Dolomite, fractured, vuggy)

| Item— | Lowest value | Highest value | Arithmetic average |
|---|---|---|---|
| Porosity, per cent | 3.06 | 8.15 | 5.54 (11 plugs) |
| Permeability to air, md. | 0.4 | 58.0 | 13.25 (10 plugs) |

**TABLE 4—CORRELATION OF RESERVOIR PERFORMANCE STATISTICS**

(Maximum observed bottom-hole pressure [July 24, 1950], 4,105 psia. at —6,350 ft., new field pressure datum)

| | 10-12-51 | 1-10-52 | 4-10-52 | 7-10-52 |
|---|---|---|---|---|
| 1. Average field reservoir pressure, psia. | 3,821 | 3,721 | 3,593 | 3,506 |
| 2. Pressure drop between surveys, psi. | | 100 | 128 | 87 |
| 3. Cumulative oil production, bbl. | 660,000 | 1,030,000 | 1,490,000 | 1,859,700 |
| 4. Oil production between surveys, bbl. | | 370,000 | 460,000 | 369,700 |
| 5. Bbl. oil/lb. drop between surveys | | 3,700 | 3,593 | 4,249 |

## Core Data

A core analysis in Anderson-Prichard Oil Corp. 1 H. C. Bevers, NE NE 39, Blk. DD., John H. Gibson Survey, reveals the low values of porosity and air permeabilities of the matrix.

From an analysis prepared by Core Laboratories, Inc., of Midland, Tex., the porosity-permeability relationship has been plotted on log-log paper. The range of values and arithmetic averages are shown in Table 3.

**Reef core . . .** Reef-core rock is comprised of structureless, crinoidal, gray, vuggy dense to coarsely granular dolomite. At the periphery, dolomites in the reef grade into calcareous dolomites and gray, fine-grained dolomitic limestones. On the northeast edge of the reef, a 16-ft. zone of limestone intercalated with shale stringers is known from core data to occur at a level of from 44 to 60 ft. above the oil-water contact.

## Reservoir Behavior

Reservoir performance of the Wolfcamp reef reservoir at Wellman is shown in Fig. 7. The last field-wide gas-oil ratio survey conducted during June 1952 showed an arithmetic average of only 401 cu. ft. per bbl. which is 166 cu. ft. per bbl. below the solubility gas-oil ratio.

Reservoir-pressure decline, under the current field withdrawals rates exceeding 5,000 bbl. per calendar day, has not been excessive.

Correlation of reservoir performance statistics shown in Table 4 indicates the high bbl. oil per lb. pressure drop as based on field-wide pressure surveys and production history.

Evidence of the operation of a highly effective water drive is deduced from (1) low produced gas-oil ratios, (2) high productivity indexes at high flow rates,

**TABLE 5—SUMMARY OF RESERVOIR PERFORMANCE, INITIAL CONDITIONS, AND AS OF JULY 10, 1952**

(Wellman field—Wolfcamp Reef reservoir, Terry County, Texas)

| | |
|---|---|
| A. Original conditions— | |
| 1. Ultimate producing areas, acres | 1,400 |
| 2. Maximum observed reservoir pressure (new datum —6,350 ft.), psia. | 4,105 |
| 3. Highest productive structural contour, ft. subsea | *5,857 |
| 4. Oil-water contact, ft. subsea | †6,677 |
| 5. Maximum productive relief, ft. | 820 |
| B. Conditions as of July 10, 1952— | |
| 1. Cumulative oil recovery (from 7-1-50), bbl. | 1,811,074 |
| 2. Average cumulative oil recovery per attributable acre, bbl. | 1,677 |
| 3. Average cumulative oil recovery per well, bbl. | 67,077 |
| 4. Arithmetic average field static bottom-hole pressure, psia. (new datum —6,350 ft.) from 17 wells (4-10-52), psia. | 3,578 |
| 5. Field average cumulative pressure decline, psia. | 527 |
| 6. Daily average field oil allowable, April 1952, bbl. | 5,450 |
| 7. Daily average field oil rate, April 1952, bbl. | 5,467 |
| 8. Number of wells on production | 27 |
| 9. Proved developed acreage, acres | 1,080 |
| 10. Average produced gas-oil ratios (June 1952), from 12 wells, cu. ft. per bbl. | 401 |

*Magnolia Petroleum Co. 4 Harmon Scales, NE NW 12, Blk. C-36, PSL Sur. †Established at —6,677 ft. in Stanolind Oil & Gas Co. 5 M. G. Scales, SE NW NW 22, Blk. C-36, PSL Sur.

(3) pressure-production relationship, and (4) analysis of isobaric contour map.

Fracturing in a low-permeability reef bioherm has brought about highly effective permeability. Consequently, there is very good communication of fluids between wells as represented by relatively uniform isobaric contours; an exception is a pressure sink in the central southern part of the field.

**Completion method . . .** Due to the character of the structure, a reef bioherm, considerable penetrations of the reef have been drilled near the center of the field. After contract depth is reached, conventional electrical logs are run including a detail electrical log of the reef section and a MicroLog. Laterolog has been run in a few wells. On completion of logging surveys, the long string of 5½-in. pipe is set and cemented. Gun perforator is run on all wells and pay selected from MicroLog porosity.

Most of the 27 oil wells at Wellman have been completed natural. However, in a few wells completed near the periphery of the field, initial treatments of 10,000 gal. of acid were used to make the wells flow. On the Mary Gladys Scales lease of Stanolind on the northeast side of the reef, wells drilled to the base of the oil column after perforating were washed in with 500 gal. of acid each.

**TABLE 6—PROPERTIES OF RESERVOIR CRUDE OIL**

| | |
|---|---|
| 1. Maximum reservoir temp., °F. | *162 |
| 2. Bubble-point pressure, psia. | 1,290 |
| 3. Solution gas-oil ratio at bubble-point pressure, cu. ft./bbl. | 577 |
| 4. Reservoir volume factor, bbl./bbl. | 1.3968 |

*Stanolind Oil & Gas Co. 1 A. A. Scales, Sec. 14, Blk. DD, J. H. Gibson Sur.

**TABLE 7—DAILY AVERAGE CRUDE-OIL PRODUCTION AND WELLS, WELLMAN FIELD, TERRY COUNTY, TEXAS**

(Source: Railroad Commission of Texas, Austin, Tex.)

| Year— | Producing wells | Bbl. |
|---|---|---|
| 1950: | | |
| July | 1 | |
| August | 1 | 201 |
| September | 1 | 198 |
| October | 2 | 290 |
| November | 4 | 395 |
| December | 4 | 812 |
| 1951: | | |
| January | 5 | 898 |
| February | 6 | 696 |
| March | 8 | 1,303 |
| April | 8 | 1,869 |
| May | 10 | 2,237 |
| June | 10 | 2,338 |
| July | 12 | 2,640 |
| August | 13 | 2,805 |
| September | 14 | 3,329 |
| October | 16 | 3,713 |
| November | 18 | 3,000 |
| December | 19 | 4,257 |
| 1952: | | |
| January | 19 | 4,111 |
| February | 24 | 5,213 |
| March | 24 | 5,586 |
| April | 25 | 5,467 |
| May | 26 | (*) |

*Reported production affected by strike.

### Acknowledgments

Thanks are due the following for material used in preparation of this article: K. C. Anderson, district geologist, Anderson-Prichard Oil Corp., Midland, Texas; R. M. Caywood, reservoir engineer, Anderson-Prichard Oil Corp., Oklahoma City; H. T. Morley, chief geologist, and Lloyd Elkins, production research director, Stanolind Oil & Gas Co., Tulsa; and Harold W. Sherrod, Stanolind, Midland, Tex.

### References

1. Richardson, Carl B., "Regional Discussion of Pennsylvanian Reefs of Texas," annual meeting, A.A.P.G., S.E.G., and S.E.P.M., Chicago, Ill., April 24-27, 1950.
2. Agnich, F. J., "Geophysical Exploration for Limestone Reefs," Geophysics, Vol. XIV, No. 4 (October 1949), pp. 486-500.
3. Ibid.

RED DEVIL

"DIA-HARD" LINERS

*For high pressure abrasive service*

Forged in one piece from highest quality alloy steel. The deep HIGH-CARBON wear resistant case of maximum hardness and uniformity is obtainable only by our SPECIAL "DIA-HARD" PROCESS, greatly excelling all other known methods for longer life liners. The bore is PRECISION HONED, and ACCURATE OUTSIDE DIMENSIONS insure a perfect working fit with liner packing assembly and pump cylinder for positive leakproof sealing. Write for Catalog No. P-120.

TELL-TALE LINER PACKING ASSEMBLIES

*Gives warning before damage*

Tell-Tale Liner Packing Assembly consists of two "DIA-TEX" oil and heat resistant sealing rings separated by a precision made steel, corrosion-resistant lantern ring. Internal leakage is detected instantly in slush pumps through "tell-tale holes" before costly fluid cuts occur to cylinder walls. There is either a Tell-Tale Liner Packing Assembly or a "DIA-TEX" Sealing Ring available for all makes of slush pumps. Write for Catalog No. P-121.

LINER PULLERS

*Save valuable time and labor*

The Red Devil Liner Puller is a strong, heavy duty, dependable tool capable of pulling the most obstinate liner. Its operation is simple. There are no pins, connecting links or other small parts to bend, shear, break or become lost.

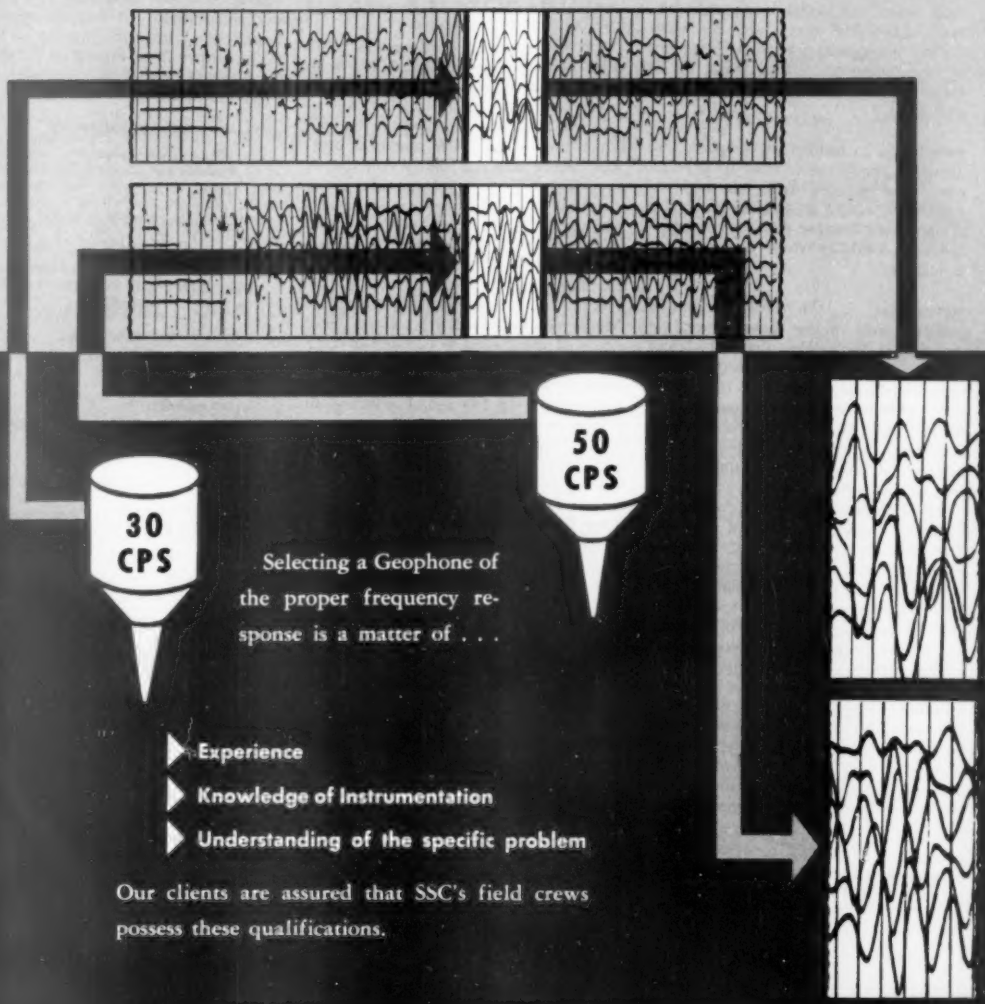
The "Universal Type" Puller (as illustrated) is designed for slush pumps. The "Expanding Grip Type" is designed for pulling thin wall-driven tube type liners, as used in small pumps. Write for Catalog No. P-122.

See Composite Catalog . . . For more detailed information on Red Devil Products, see the Composite Catalog or write for special price catalogs noted above. Red Devil products are available through your supply store.

OIL WELL MANUFACTURING CORP.
6002 South Alameda St., Los Angeles 1, California

Basic Methods of Improving Seismic Records . . .

# The Effect of GEOPHONE FREQUENCY




Selecting a Geophone of the proper frequency response is a matter of . . .

- Experience
- Knowledge of Instrumentation
- Understanding of the specific problem

Our clients are assured that SSC's field crews possess these qualifications.

**Seismograph Service Corporation**

Seismic Surveys – Gravity Surveys – Pilot Crews – Lorac

TULSA 1, OKLAHOMA, U.S.A.

## Schleicher County

*(Continued from page 125)*

duction Co., Skelly Oil Co., Sinclair Oil Co., Ohio Oil Co., and Standard Oil Co. of Texas.

**Hulldale North field . . .** One mile north of Hulldale field proper lies an area designated by the Railroad Commission as Hulldale North, which also produces from the Strawn reef. To date, 12 oil wells have been completed in this reservoir on 40-acre spacing with field limits not defined except to the east. Currently there are six wells drilling on regular pattern development by the following firms: Ohio, J. C. Hawkins, Standard Oil Co. of Texas, and Sinclair.

**Structure . . .** Limited development indicates a moderate amount of productive relief ranging from as high as —3,385 to as low as —3,430 ft. on top of the first effective porosity. Average depth to the pay from derrick floor is 5,556 ft.

**Neva West . . .** Third of a group of prolific reefs under development at this time is Neva West field which lies 2 miles west of Hulldale North and 3 miles northwest of Hulldale field proper. At this time there are eight producing wells in the Strawn formation, developed on 40-acre spacing. Limits of the reef have not been defined except in one well to the east.

The field was discovered August 12, 1951, by Wesley W. West, of Houston, Tex. The reef surface dips sharply, ranging from 1,070 ft. per mile on the northwest side to 750 ft. per mile on the southeast side. At least 88 ft. of gas column and 166 ft. of oil column are known from present development.

The Strawn reef reservoir at Neva West is highly fractured; this condition accounts for the high potentials and productivities despite the low porosity of 13 per cent and low permeability of only 50 md. for the effective pay section. Four productivity-index tests showed average productivities ranging from 2.685 to 7.286 bbl. of oil per day per pound pressure drop.

Gas-oil interface was entered by Wesley W. West 1 Mittel at —3,859 ft. Oil-water interface was found at —4,025 ft., marking an oil column of 166 ft. as described above.

Original reservoir pressure was 2,539 psig. at datum of —3,986 ft. With withdrawals of 139,316 bbl. from discovery date of August 12, 1951 to May 18, 1952, reservoir pressure has declined only 45 psi. The moderate pressure decline and the high productivities suggest that the reservoir operates under a partial water-drive mechanism. Average productivity index is 5.3 bbl. of oil per day per pound and measured indexes range from .244 to 12.88 bbl. per day per pound.

**Media characteristics . . .** Cores from one well show average porosity of 1.55 per cent, average horizontal permeability of 196 md., and average vertical permeability of 148 md. Producing oil gravity is 46° A.P.I., which compares with 42° in Hulldale field proper. An aggressive drilling campaign on 40-acre spacing is indicated for this field.

**Page field . . .** Recent oil development from the Strawn reef reservoir in the Page field, 8 miles east of Eldorado, has resulted in several extensions to this 13-year old producing area. The discovery well was completed during 1939 from a depth of about 5,700 ft. The field has produced 1,853,817 bbl. of oil to January 1, 1951 from 46 oil wells proving up 760 acres; the crude averages 42° A.P.I. gravity and has a sulfur percentage of only 0.12.

The gas cap has produced a cumulative recovery to the same date of 18.65 billion standard cubic feet of gas from four gas wells.

Latest oil well completion was T. L. Williams, Trustee A-10 Page located 1,980 ft. from the south and east lines of Section 32, Block 1, G. H. & S. A. R.R. Co. Survey. It was finaled on September 7, 1952, for an initial production of 399 bbl. of 41°-gravity oil produced through open 2-in. tubing. Produced gas-oil ratio was initially 900 cu. ft. per bbl. The well was an open-hole completion from a 257-ft. penetration of the Strawn reef topped at 5,343 ft.; the top of the pay was found 152 ft. below the reef top.

This well follows behind the completion of Williams' A-9 Page, located 1,980 ft. from the north and west lines of the same section on July 14, 1952. Initial production was 432 bbl. of 41°-gravity oil produced through open 2-in. tubing. Gas-oil ratio was 990 cu. ft. per bbl. initially. It was an open-hole completion with 7-in. pipe set at 5,430 ft. in Strawn lime topped at 5,206 ft.; total depth was 5,560 ft. with pay logged at 5,442 ft.

TABLE 1

**Summary of Allowables for Month of October 1952—Strawn (Pennsylvanian) Limestone Reefs—Schleicher County, Texas, District 7-C**

(Data: Railroad Commission of Texas)

| Field— | Gross allowable* | Net allowable† |
|---|---|---|
| Hulldale | 6,087 | 4,713 |
| North Hulldale | 867 | 671 |
| Neva West-Strawn | 2,310 | 1,789 |
| Page | 866 | 670 |
| Total | 10,130 | 7,846 |

*Calendar-day basis. †Producing-day basis.

TABLE 2—CASING AND CEMENTING PRACTICES—STRAWN REEF FIELDS—SCHLEICHER COUNTY, TEXAS

| Field— | Surface casing | Long string |
|---|---|---|
| Hulldale | 9⅝-in.: 545-ft. (300 sacks) | 5½-in.: 5,716-ft. (400 sacks) |
| North Hulldale | 9⅝-in.: 500-ft. (300 sacks) | 7 in.: 5,600-ft. (400 sacks) |
| Neva West | 13⅜-in.: 660-ft. (350 sacks) | 5½-in.: 6,369-ft. (340 sacks) |
| Page | 10-in.: 369-ft. (200 sacks) | 5½-in.: 5,485-ft. (250 sacks) or 7-in.: 5,430-ft. (300 sacks) |


### Acknowledgments

The writer acknowledges the assistance of H. C. Matheny and Clem H. Roberts, of Delta Gulf Drilling Co., Tyler, Tex., and G. W. Walla, geologist, and Glenn C. House, petroleum engineer, both with Wesley W. West.


TABLE 3

**Summary of Reservoir Data—Hulldale and Neva West Fields, Schleicher County, West Texas**

| | Hulldale | Neva West |
|---|---|---|
| **Structural Data** | | |
| 1. Average depth to top of reef, ft. | 5,600 | 6,166 |
| 2. Gas-oil interface, ft. | | —3,859 |
| 3. Oil-water interface, ft. | —3,470 | —4,025 |
| 4. Max. gas column, ft. | | 88 |
| 5. Max. oil column, ft. | 148 | 166 |
| **Core Data** | | |
| 1. Average porosity, % | 8 | 5.5 |
| 2. Average horizontal permeability, md. | 35 | 196 |
| 3. Average vertical permeability, md. | | 148 |
| 4. Average residual oil saturation, % | | 9.5 |
| 5. Average total water saturation, % | | 48.2 |
| 6. Original reservoir pressure, psig. | *2,263 | †2,537 |
| **Reservoir Oil Properties** | | |
| 1. Bubble-point pressure, psig. | | 2,035 |
| 2. Solubility gas-oil ratio, cu. ft. per bbl. | | 1,033 |
| 3. Formation volume factor, bbl./bbl. | | 1.622 |
| 4. Viscosity at reservoir temperature, cp. | | 0.372 |
| 5. Max. reservoir temp., °F. | *150 | 160 |
| **Reservoir Performance** | | |
| 1. Type reservoir mechanism | Partial WD | Partial WD |
| 2. Average productivity index, bbl. oil per day per pound | ‡3.9 | 5.3 |
| 3. Range of productivity indexes | 2.2 to 10.7 | 3.31 to 5.84 |
| 4. Averaged weighted produced gas-oil ratio, cu. ft. per bbl. | 646 | 805 |

*Measured at —3,400 ft. †Measured at 3,986 ft. ‡Average of 10 wells.

# ELECTRICAL & RADIOACTIVITY SURVEYS

*Serving the Permian and San Juan Basins in West Texas and New Mexico, West Central Texas, North Texas and the Panhandle.*

**GENERAL OFFICES: 1305 COMMERCE • DALLAS, TEXAS**

**FIVE OFFICES**
***Strategically Located for***
**FAST, RELIABLE SERVICE**

•

**WEST TEXAS ELECTRICAL LOG SERVICE**
1st NATIONAL BANK BLDG.
MIDLAND

•

**NORTH TEXAS WELL LOG SERVICE**
STALEY BLDG. • WICHITA FALLS
BACON BLDG. • ABILENE

•

**PANHANDLE ELECTRICAL LOG SERVICE**
516 TYLER STREET
AMARILLO

---

# THE FIRST NATIONAL BANK

**MIDLAND, TEXAS**

ACTIVE IN OIL
DEVELOPMENT
SINCE ITS DISCOVERY
IN THE PERMIAN BASIN

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

---

*Oil Accounting is*
**DIFFERENT!**
*this book →*

**CLEARS UP ACCOUNTING PROBLEMS UNKNOWN IN ANY OTHER INDUSTRY**

"Practical Accounting for Oil Producers" is the only book ever written on this highly specialized subject. 656 pages of text, illustration and specimen voucher entries, 37 thorough chapters. But see for yourself what it can mean to you. Examine it 5 days — FREE. Or better, send us $9.50 and we'll imprint your name on the cover and pay all the postage. . . . Please letter name you want imprinted on coupon below.

**ROSS-MARTIN COMPANY • Box 800-H**
**Tulsa 1, Oklahoma**

Please send me_____copies of this book at $9.50 each

Name _____

Company _____

Address _____

City, Zone, State _____

## TABLE 4—SUMMARY OF GEOLOGICAL TOPS—HULLDALE AND NORTH HULLDALE (PENNSYLVANIAN REEF) FIELDS, SCHLEICHER COUNTY, TEXAS

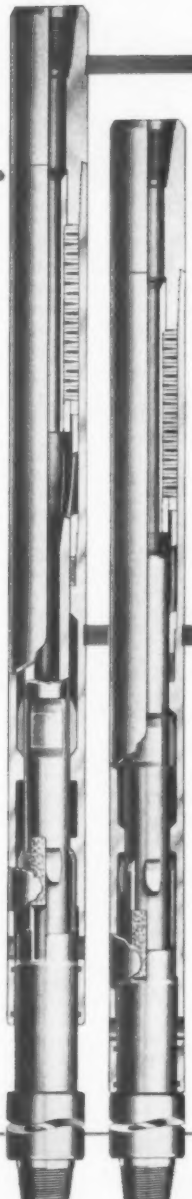
### HULLDALE

| Operator, lease and well No.— | Section | Surface elevation (ft.) D.F. | Surface elevation (ft.) G.L. | Top of lime (ft.) | Top of effective porosity (ft.) | Base of effective porosity (ft.) | Total depth (ft.) | Comments |
|---|---|---|---|---|---|---|---|---|
| DELTA GULF DRILLING CO.: | | | | | | | | |
| 1 H. F. Thomson | 71 | 2,368 | 2,356 | —3,360 | —3,403 | Not penetrated | —3,439 | Discovery well |
| 2 H. F. Thomson | 71 | 2,422 | 2,412 | —3,523 | —3,615 | Not penetrated | —3,688 | Dry hole |
| 1 Mrs. Mary L. Fowler | 72 | 2,310 | 2,300 | —3,304 | —3,426 | —3,534 | —3,553 | Dry hole |
| 2 Mrs. Mary L. Fowler | 72 | 2,303 | 2,292 | —3,212 | —3,372 | —3,457 | —3,470 | |
| 1 Mrs. Viola McWhorter | 70 | 2,341 | 2,331 | —3,185 | —3,356 | Not penetrated | —3,451 | |
| 2 Mrs. Viola McWhorter | 70 | | | | | | | Not completed, 9-24-52 |
| 1-B Mrs. Viola McWhorter | 70 | | | | | | | Not completed, 9-24-52 |
| 1-B H. F. Thomson | 82 | 2,392 | 2,380 | —3,326 | —3,395 | Not penetrated | —3,428 | |
| 2-B H. F. Thomson | 82 | 2,348 | 2,338 | —3,257 | —3,366 | Not penetrated | —3,415 | |
| 3-B H. F. Thomson | 82 | 2,330 | 2,320 | —3,162 | —3,322 | Not penetrated | —3,415 | |
| 4-B H. F. Thomson | 82 | 2,301 | 2,291 | —3,154 | —3,317 | —3,439 | —3,459 | |
| 1-C H. F. Thomson | 82 | 2,338 | 2,329 | —3,143 | —3,300 | —3,400 | —3,457 | |
| 2-C H. F. Thomson | 82 | 2,330 | 2,322 | —3,128 | —3,300 | —3,387 | —3,471 | |
| 1-D H. F. Thomson | 82 | 2,325 | 2,315.5 | —3,181 | —3,344 | Not penetrated | —3,451 | |
| 2-D H. F. Thomson | 82 | 2,318 | 2,305 | —3,174 | —3,342 | —3,416 | —3,447 | |
| STANDARD OIL CO. OF TEXAS: | | | | | | | | |
| 1 Mrs. Viola McWhorter | 70 | | | | | | | Set 13⅜-in. at 450 ft. TD 1,450 ft. (cable tools released 11-26-51) |
| 2 Mrs. Viola McWhorter | 70 | 2,363 | 2,353 | —3,079 | —3,352 | Not penetrated | —3,441 | |
| 1 H. F. Thomson | 71 | 2,338 | | —3,354 | —3,411 | Not penetrated | —3,457 | |
| 1 Mrs. Mary L. Fowler | 72 | 2,327 | | —3,273 | No porosity to —3,429 | End of log —3,429 | —3,444 | Pumping well in interval —3,429 to —3,444 ft. (perfs. ?) |
| 2 H. F. Thomson | 82 | 2,357 | 2,346 | —3,156 | —3,326 | Not penetrated | —3,430 | |
| 3 H. F. Thomson | 82 | 2,396 | 2,385 | —3,300 | —3,376 | Not penetrated | —3,432 | |
| AMERICAN REPUBLICS CORP.: | | | | | | | | |
| 1 H. F. Thomson | 82 | 2,385 | 2,375 | —3,317 | —3,377 | —3,466 | —3,489 | |
| 2 H. F. Thomson | 82 | 2,328 | 2,315 | —3,200 | —3,377 | Not penetrated | —3,487 | |
| 3 H. F. Thomson | 82 | 2,293 | 2,283 | —3,191 | —3,343 | —3,437 | —3,450 | |
| 4 H. F. Thomson | 82 | 2,286 | 2,277.5 | —3,162 | —3,324 | —3,441 | —3,451 | |
| 1 W. McClatchy | 83 | 2,329 | 2,316 | —3,172 | —3,343 | —3,424 | —3,470 | |
| 2 W. McClatchy | 83 | | | | | | | Not completed, 9-24-52 |
| 3 W. McClatchy | 83 | 2,334 | 2,320 | —3,087 | —3,302 | —3,353 | —3,455 | |
| 4 W. McClatchy | 83 | | | | | | | Not completed, 9-24-52 |
| SKELLY OIL CO.: | | | | | | | | |
| 1 W. A. Davis | 43 | 2,256 | | —3,128 | —3,369 | —3,393 | —3,462 | |
| 2 W. A. Davis | 43 | 2,250 | | —3,123 | —3,346 | (?) | —3,417 | |
| 3 W. A. Davis | 43 | 2,266 | 2,256 | —3,119 | —3,307 | Not penetrated | —3,425 | |
| 4 W. A. Davis | 43 | 2,296 | 2,287 | —3,066 | —3,252 | —3,400 | —3,436 | |
| PAN AMERICAN PROD. CO.: | | | | | | | | |
| 1 Mrs. Viola McWhorter | 70 | 2,350 | 2,341 | —3,207 | —3,366 | Not penetrated | —3,427 | |
| 2 Mrs. Viola McWhorter | 70 | 2,385 | 2,376 | —3,325 | —3,404 | Not penetrated | —3,435 | |
| 1 H. F. Thomson | 71 | 2,388 | 2,380 | —3,352 | —3,400 | Not penetrated | —3,435 | |
| 2 H. F. Thomson | 71 | 2,366 | 2,357.6 | —3,361 | —3,396 | Not penetrated | —3,437 | |
| 1 Mrs. Mary L. Fowler | 72 | 2,336 | 2,328.5 | —3,378 | —3,426 | Not penetrated | —3,445 | |
| 3-A H. F. Thomson | 82 | 2,299 | 2,289 | —3,147 | —3,296 | —3,362 | —3,435 | |
| 4-A H. F. Thomson | 82 | 2,293 | 2,283 | —3,129 | —3,305 | —3,412 | —3,441 | |
| OHIO OIL CO.: | | | | | | | | |
| 1 T. W. Thomson | 81 | | | | | | | Abd. at shallow depth |
| 1-A T. W. Thomson | 81 | 2,326 | 2,316 | —3,283 | —3,410 | —3,492 | —3,618 | |
| 2 T. W. Thomson | 80 | | 2,200 | —3,350 | —3,407 | | —3,496 | North Hulldale |
| 3 T. W. Thomson | 81 | 2,317 | | —3,290 | —3,425 | Not penetrated | —3,480 | |
| 4 T. W. Thomson | 81 | 2,301 | 2,290 | —3,253 | —3,455 | Not penetrated | —3,478 | Dry hole |
| 5 T. W. Thomson | 81 | 2,308 | | —3,220 | —3,393 | Not penetrated | —3,478 | |
| 6 T. W. Thomson | 80 | | 2,233 | —3,325 | —3,373 | | —3,529 | North Hulldale |
| 7 T. W. Thomson | 81 | 2,284 | | —3,201 | —3,373 | Not penetrated | —3,475 | |
| 9 T. W. Thomson | 81 | 2,359 | | (?) | —3,416 | (?) | —3,486 | |
| 10 T. W. Thomson | 81 | 2,314 | 2,302 | —3,219 | —3,379 | —3,468 | —3,478 | |
| 11 T. W. Thomson | 81 | 2,282 | | —3,192 | —3,362 | (?) | —3,510 | |
| 12 T. W. Thomson | 81 | 2,276 | | —3,194 | —3,367 | (?) | —3,511 | |
| 14 T. W. Thomson | 81 | 2,272 | | —3,180 | —3,350 | (?) | —3,503 | |
| 15 T. W. Thomson | 81 | 2,263 | | —3,174 | —3,353 | (?) | —3,497 | |
| 16 T. W. Thomson | 81 | 2,251 | | —3,179 | —3,357 | (?) | —3,477 | |
| 17 T. W. Thomson | 81 | 2,307 | | —3,193 | —3,362 | —3,503 | —3,515 | |
| 22 T. W. Thomson | 80 | 2,272 | | —3,300 | —3,430 | | —3,470 | North Hulldale |

### NORTH HULLDALE

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| HIAWATHA OIL & GAS CO.: | | | | | | | | |
| 1 Runge | .. | | 2,215 | —3,385 | —3,385 | | —3,460 | |
| 2 Runge | .. | | 2,170 | —3,370 | —3,410 | | —3,441 | |
| SINCLAIR OIL & GAS CO.: | | | | | | | | |
| 1 Davis | .. | | 2,202 | —3,386 | —3,449 | | —3,500 | |
| 2 Davis | .. | | 2,160 | —3,370 | —3,405 | | —3,526 | |
| 3 Davis | .. | | 2,166 | —3,416 | —3,474 | | —3,497 | |

# No Wonder the Shaffer-Waggener Bumper Safety Joint is Revolutionizing Today's Drill String Protection!



Locked Position



Tripped Position

## THE ECONOMY AND SAFETY OF 2 TOOLS IN 1

**backed by performance records like these . . .**

▸On California's deepest well, a Shaffer-Waggener Bumper Safety Joint running in the drill string just above the drill collars, proved invaluable in recovering the drill string from a depth of 18,136 ft. When the string became stuck, only 2¾ turns of back torque were required at the table to release the Safety Joint portion of the tool, permitting immediate recovery of all drill pipe. Fishing jars were then placed in the recovered string, with the recovered portion of the Bumper Safety Joint on bottom, and this string was run back into the well. The tool was easily reconnected to the Safety Joint portion on the fish, and after jarring the drill collars and bit loose, the entire string was recovered—*from approximately 3½ miles deep*—leaving a completely clean hole!

▸On another well a Shaffer-Waggener Bumper Safety Joint was in the string between drill collars and drill pipe when the string parted going into the hole, dropping over 2,400 ft. of pipe and drill collars 5,000 ft. to the bottom of the well at 16,883 ft. First, the top of the fish was gripped with a socket and the Bumper Safety Joint released, permitting immediate recovery of 2,100 ft. of drill pipe. Then the upper part of the Bumper Safety Joint was run back into the hole below a set of jars, reconnected to the lower part of the Bumper Safety Joint and—after jarring—the drill collars were completely recovered *from over 3 miles deep*, leaving the hole completely clean!

▸Besides operating successfully at even great depths, this tool takes slant holes in stride—has been used efficiently in extreme directionally-drilled wells with a slant of 60°!

***In fact, on job after job—from the shallowest to the deepest—the Shaffer-Waggener Bumper Safety Joint is bringing entirely new standards of safety, efficiency and protection to modern drilling operations!***

### Combines 2 tools in 1

The Shaffer-Waggener Bumper Safety Joint is the *only* tool of its kind—the ONE tool that combines BOTH *jarring* and *releasing* action—each under the full control of the operator. And not only does it combine in *one* tool the protection usually requiring several tools, but it also provides advantages *found in no other single tool or combination of tools!*

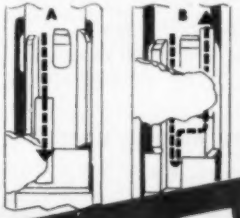
### Check These Advantages . . .

To use the tool as a Bumper Sub it is only necessary to slack the weight of approximately 2000 ft. of drill string upon the Bumper Safety Joint, thus actuating a tripping mechanism which trips *automatically*, allowing the tool to strike a sharp downward blow. Raising the string then *automatically* resets the tool for another blow—and blows can be struck repeatedly and continuously by simply raising and lowering the drill string. It's simple, positive, *automatic!*

To use as a Safety Joint for quick release in the event the stuck pipe cannot be loosened, simply trip the tool and apply left torque as the string is slowly raised (A). The reverse torque rotates the drive keys into an unlocking slot (B) so that, by simply continuing to raise the string, complete release is effected. Further, the recovered portion of the tool can be used on the bottom of a fishing string and easily reconnected to the portion in the hole for simplified recovery operations.

As a Safety Joint the tool will not release until it is tripped. Therefore, it will transmit full torque loads in *either* direction—a definite advantage over conventional Safety Joints.

Two tools in one means simplified maintenance, simpler design, plus substantial savings in operating costs.




29 years OF OIL TOOL LEADERSHIP

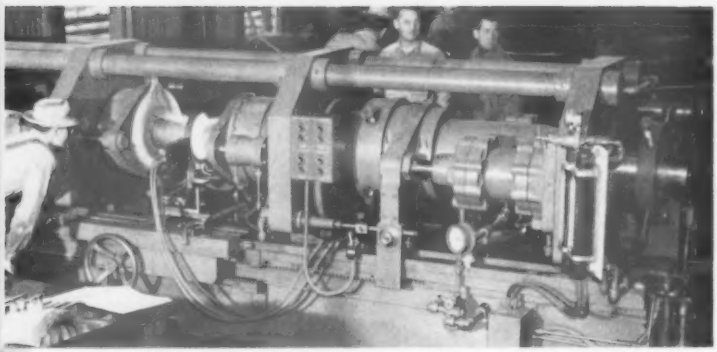
*The many vital advantages of this revolutionary tool are too numerous to cover here, but are described in detail in an eight-page bulletin we will gladly send you. Write today!*

**SHAFFER**

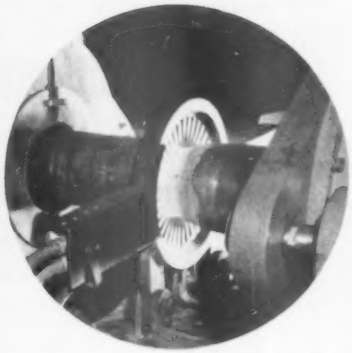
HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

SHAFFER TOOL WORKS, Brea, California • California Service Shops: Santa Fe Springs and Taft
HOUSTON, TEXAS, 6006 Navigation Blvd. • ODESSA, TEXAS, 1935 West Second Street
OKLAHOMA CITY, OKLAHOMA, Acme Oil Tool Company, 1001 S. E. 29th Street
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 1788
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

**See your Shaffer representative for detailed information on Shaffer products. Or write for a free copy of the complete Shaffer Catalog.**



This machine produces a weld which cannot be detected even by microscopic examination. Joint is made without adding metal.



Circular torch distributes heat uniformly during operation.

# How to Double a Kelly's Useful Life . . .

## *New welding method makes other reconditioning possible*

**by R. B. Tuttle**
Associate Editor

OUT in the West Texas-New Mexico section of the Permian basin country, the useful life of kellies is being extended virtually twice that experienced in normal drilling operations. This additional life results from a few simple operations performed by one service company in the area. Similar operations on other heavy oil-field tubular equipment are also being carried out at appreciable savings.

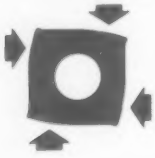
In revamping a kelly to prolong its operating life, only a small quantity of new metal is required for the average job. This factor alone is of prime importance in view of the current steel situation. Ratio of weight of the new part to the total weight of the entire kelly is quite low, even in extreme cases. Revamping or reclaiming of heavy wall tubular equipment for other oil-field services also seldom requires any large amount of new steel or alloy.

Success of the reconditioning operations is due largely to the welding method employed for attaching new parts. The other steps involve high-quality machining of the completed job. Intermediate steps are carried out by conventional methods, accurately controlled.

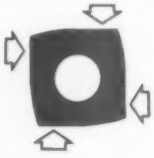
For the rebuilding of a kelly with badly worn faces at the points where driving pressure is concentrated, only one new part is normally needed to produce a satisfactory job. This part is the bottom, upset end which is replaced with a new end of larger diameter. By making this alteration, turning down the other end, and suitable finish machining, the kelly barrel is reversed, end for end, and is ready for service. The worn faces are now away from the points of concentrated driving pressures. The various steps involved in reversing the kelly faces are illustrated in the accompanying sketches.

To produce a weld which is as strong as the original metal in a kelly or other tubular equipment, special welding techniques are employed. No weld metal is added in joining the two pieces and after suitable heat treating and machining, the joint is not distinguishable by microscopic inspection methods. Metallurgical analysis of the joint

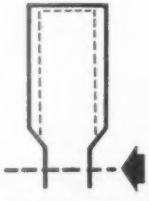
## How the welding operation prolongs kelly life



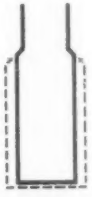
Wear on a kelly occurs along its faces at points where driving force is concentrated. When worn to degree indicated in sketch, kelly is no longer serviceable.



Additional service life can be obtained from worn kelly when its barrel can be turned end for end. As indicated in sketch, unworn faces are then at wear points.



To alter the kelly so that it can be used in its end-for-end position the old bottom end must be cut off and replaced with a new larger diameter end for swivel connection.



The original large upset end of the kelly which connected to the swivel is next machined to meet the dimensions of a bottom end. This step completes the job.

and adjacent areas show a uniform structure both through and along the bonded region. Tests on various steel and alloy joints reveal that the physical properties of the original metal have been retained.

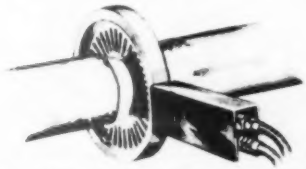
Special equipment is used to carry out the welding operation. This equipment is designed to weld heavy-walled tubes, kellies, or other similar items of diameters up to 9 in. Over-all length of the item which the machine is capable of handling is limited only to that of practicability of transportation between field and machine. Machining operations, particularly those involving finishing, are the limiting factors on length of the item which is to be welded. These limits are also governed by practicability but are such that length problems are not encountered in the shop where the machinery is located. The machine itself and the plant where it is located are shown in the accompanying photographs.

Before the welding machine is put into use, the two parts to be joined are accurately machine faced and given a bevel cut. The bevel compensates for upsetting at the weld. Properties of the bevel cut are illustrated in Step 1 of the accompanying sketch. In Step 2 the parts are being set up for welding in the special machine as indicated in the sketch. The two split-ring sections shown in the sketch of Step 2 are a specially designed oxyacetylene heating

## How machine operates . . .

Step 1—Ends of the two parts to be joined are accurately machined with a bevel.

Step 2—Parts are placed in special machine equipped with circular torch.



Step 3—On reaching proper temperature, pressure on welded zone causes bond.

Aerial view of Baash-Ross plant at Odessa, Tex.


stop circulation loss!

with SEAL FLAKES

finest lost circulation preventative ever used in burglar porosities

Completely inert, does not ball up or absorb water, does not affect chemical properties or mud fluid, retains its strength and restores lost circulation. IT'S THE BEST!

SEAL FLAKES

the original, tested and proven in emergencies. ACCEPT NO SUBSTITUTE.

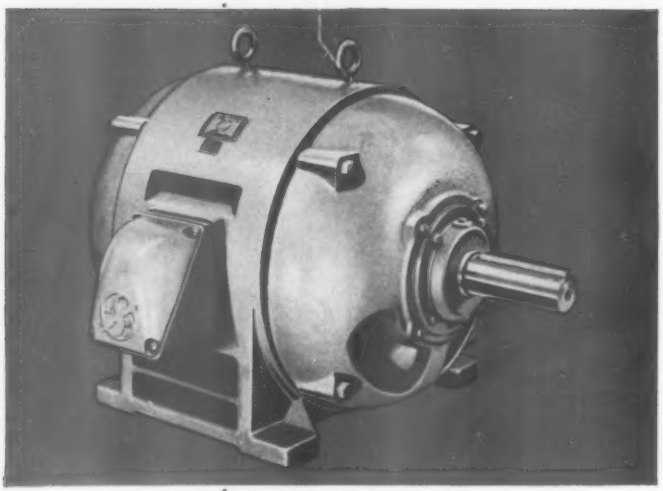
Consult your nearest mud company distributor

brooks paper company

SECURITY BUILDING • ST. LOUIS 2, MISSOURI

*Born of Research*

**PROVED BY PERFORMANCE!**



*Motors for nearly every purpose including gearmotors. A. O. Smith offers you a wide range of types and sizes from 1/3 HP to 500 HP.*

Here's a handsome motor with pleasing lines to enhance the appearance of any driven machine. More important, when you look inside you can see rugged construction, high quality materials and advanced engineering refinements. Add them up and you get years of dependable, trouble-free service backed by a nationwide organization of service and warehouse facilities. Write for latest bulletins.

*A. O. Smith, known for progress in research, engineering and production for three generations, offers you a complete line of Polyphase and Single Phase Motors. Wide variety of enclosures and mountings for every standard and special purpose application.*

78th ANNIVERSARY 1874 - 1952

**A.O.Smith**

ELECTRIC MOTORS

5715 SMITHway STREET, LOS ANGELES 22, CALIFORNIA • 1000 WEBSTER STREET, DAYTON 4, OHIO

Offices in Principal Cities. International Division, Milwaukee 1.

torch which when in operation is placed around the two parts being joined, as indicated in Step 3.

In operation the circular torch oscillates between the interfaces of the two parts being joined. Heat is uniformly distributed over the entire circumference of the weld point. Simultaneously with heating, force is applied by the machine along the axis of the item being welded. This force results in pressure at the weld point causing the two parts to bond. This method of welding without adding metal to the joint is known technically as "solid phase welding." In this process the metals are bonded without heating the metal to its molten stage.

A small amount of upsetting occurs during the bonding operation. This is desirable to produce better bonding, and after normalizing the welded joint the upset is removed by suitable machining.

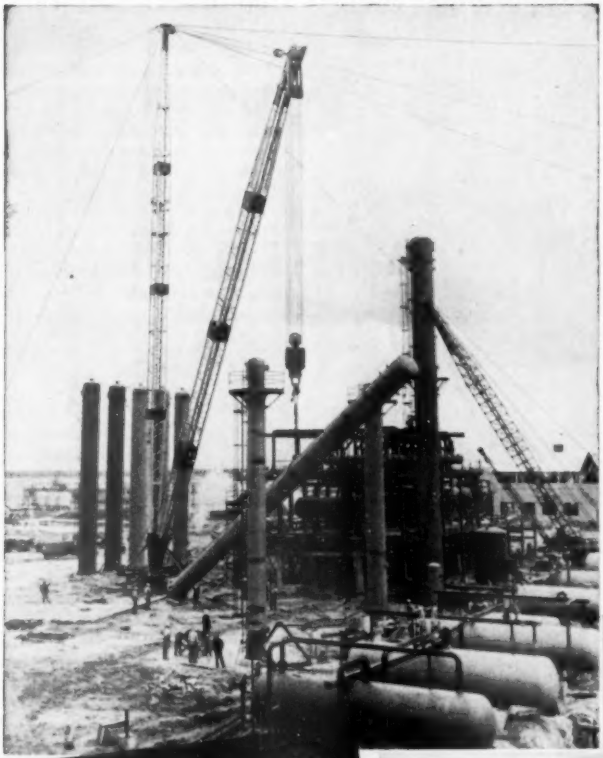
The machine which is the heart of the over-all operation is known as the Baash-Ross Pressure-Welder. Designers of the machine have incorporated facilities for accurately controlling pressure and temperature as required for welding various steels and alloys.

Currently one of the machines is in service at the Odessa, Tex., plant of Baash-Ross Tool Co. Other machines are scheduled to be placed in service in the near future at Houston and at an undesignated point in California.

The Baash-Ross plant at Odessa, one of its several installations in the major oil fields of the nation, has recently been enlarged and modernized. In addition to the pressure-welding machine, the Odessa plant is equipped with a complete range of heavy-duty machine tools, various accessory equipment and heat-treating facilities.

**"Look, Slim, I said I was sick of taxes—not Texas!"**

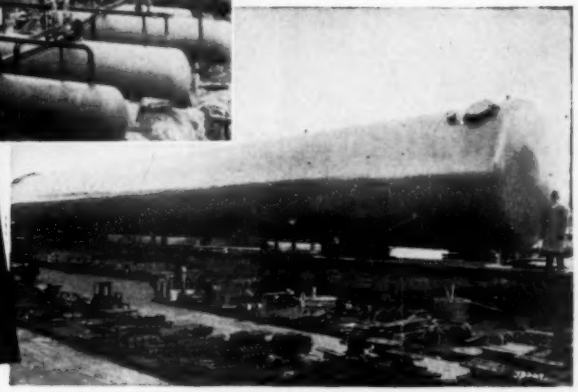
# START-TO-FINISH... *SERVICE* ALL THE WAY



By offering construction facilities adequate for any size project, Stearns-Roger rounds out a service which begins "behind the drawing boards" and includes:

DESIGN
ENGINEERING
MANUFACTURE and
CONSTRUCTION.

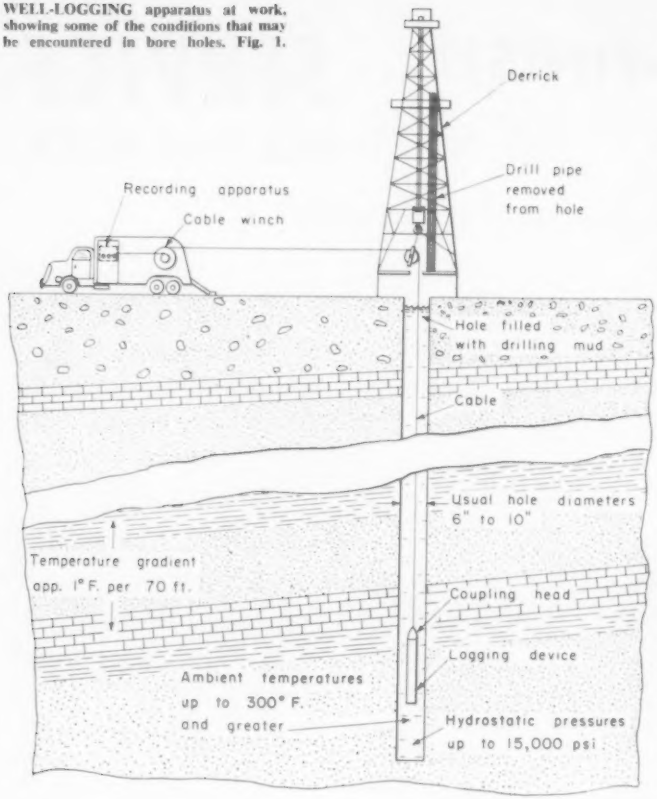
**Look to Stearns-Roger for undivided responsibility:**
**ENGINEERING** both shop and field.
**MANUFACTURING** of process equipment.
**CONSTRUCTION** by our own crews.



Dimensions of a number of units in this plant were limited only by railroad clearance from fabricating point to job site. The Primary Still, weighing 312,000 lbs. is the heaviest vessel installed in a natural gas processing plant, as far as we know. Most of the special fabricated equipment in the project was made in our Denver shops.

**Stearns-Roger**

THE STEARNS-ROGER MFG. CO. DENVER COLORADO


Derrick
Drill pipe removed from hole
Recording apparatus
Cable winch
Hole filled with drilling mud
Cable
Usual hole diameters 6" to 10"
Temperature gradient app. 1° F. per 70 ft.
Coupling head
Logging device
Ambient temperatures up to 300° F. and greater
Hydrostatic pressures up to 15,000 psi

**WELL-LOGGING** apparatus at work, showing some of the conditions that may be encountered in bore holes. Fig. 1.

# Role of Electronics in Geophysical Instrumentation

## Mobile magnetometer has aided surface exploration; scintillation counter and new electronic cartridges make well logging faster, more accurate, and more efficient.

**by Francis F. Segesman***

LITTLE reference will be made in this discussion to pure, or global, geophysics, but rather the emphasis will be on the instrumentation aspects of exploration geophysics, and with special emphasis on the requirements for subsurface instrumentation and equipment used in the geophysical exploration of bore holes.

*Schlumberger Well Surveying Corp. Paper presented as part of a symposium organized by the Institute of Radio Engineers on "Trends of Electronic Instrumentation in Industry," at the seventh National Instrument Conference and Exhibit at Cleveland, September 8-12, 1952.

### Surface Geophysical Exploration Methods

The seismic method is one of the oldest prospecting systems using electronics; an amplifier is provided for each of the geophones, usually 12 in number. Seismic amplifier circuits may include selective filter circuits, as well as peak limiting features and automatic gain control circuits, which serve to attenuate the first strong signals received and to step up the amplification as the signals become weaker.

Two of the recent interesting developments from the standpoint of electronic instrumentation may be briefly mentioned; namely, the mobile magnetometer and the scintillation counter.

The mobile magnetometer, usually referred to as the airborne magnetometer, is a recent addition to the magnetic measuring instruments available for geophysical prospecting. Adapted from a submarine-locating device developed during World War II, the mobile magnetometer is a flux-gate-type instrument, which depends for its high sensitivity on the saturation of a high permeability core. The sensing element of such an instrument, in contrast to the stationary-type magnetometers, is well adapted for mobile operation, and has made possible the rapid plotting from aircraft of magnetic intensities over large areas.

**Scintillometer . . .** Of interest in the expanding field of radioactivity exploration is the development of the more sensitive scintillation counter which may to a large extent replace the less efficient Geiger counter. This new type counter depends in its operation on the fact that crystals of certain substances such as anthracene and naphthalene, emit flashes of visible or ultraviolet light when exposed to ionizing radiation. These flashes are detected and amplified in a photomultiplier tube. The resulting pulses are further amplified and counted.

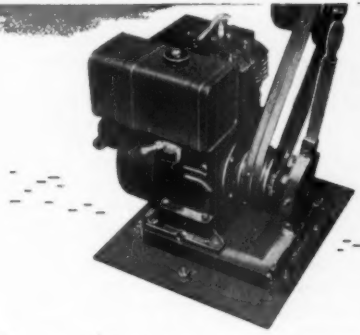
Both Geiger and scintillation counters are highly efficient in the detection of cosmic radiation, which, however, in surface exploration constitutes an undesired background noise superimposed on the desired gamma-ray signals from radioactive earth materials. A great advantage of the scintillation counter lies in the fact that, whereas only 1 out of about every 100 gamma rays produce a count in the Geiger counter, almost every gamma ray reaching the crystal of the scintillation counter produces a countable flash. The importance of the cosmic-ray background is decreased in the same proportion and becomes negligible in the scintillation counter.

Such increased sensitivity and improved signal to noise ratio allow statistically valid readings to be made with scintillation counters over much shorter time intervals, and has even made possible the recording of radioactivity profiles from low-flying aircraft.

**Design trend . . .** In the design of instruments for surface geophysical prospecting the requirements of ruggedness

*Start engines the reliable way with*

# UNITED
## *Multi-Cylinder*
## ENGINE STARTER



*Prices on Application.*
*(Most popular size $292.00)*

- RELIABLE — Continuous cranking power from easily started gasoline engine.
- ECONOMICAL — Pays for itself by eliminating troublesome battery, generator and starter maintenance.
- SAFE — Recommended by safety engineers.
- EASILY INSTALLED — Simply remove electric starting motor and insert Heavy Duty Bendix Starter Drive Assembly. (Bendix Drive operates off of ring gear. Specify type of engine to be started when ordering.)

*At Your Nearest United Supply Store*

ELIMINATES BATTERY

ELIMINATES ELECTRIC STARTER

ELIMINATES GENERATOR

Courtesy
Service
Dependability

**UNITED SUPPLY**
**AND *Manufacturing* COMPANY**
TULSA, OKLAHOMA
Stores in Kansas, Oklahoma, Texas,
Louisiana, and New Mexico

**COURTESY • SERVICE • DEPENDABILITY**

and portability must be met, since the equipment must be transportable into remote places, sometimes on the prospector's back. There is a general trend toward the miniaturization of all types of prospecting equipment, as much as is consistent with the sensitivity required. The equipment should also be well weatherproofed and adapted for hot or cold-weather use.

As an example of the above requirements mention might be made of a recently developed low-frequency electromagnetic system for measurement of subsurface conductivity, using special phase selective circuits. An alternating magnetic field is transmitted into the earth from a large horizontal coil carried by one man. The field produced by the induced eddy currents in the earth is detected by another similar coil carried by a second man. The associated electronic equipment is likewise transportable.

This quick glance at the use of the electronics in surface geophysical prospecting would not be complete without a mention of the use, in water-covered areas and in aircraft, of radio and radar aids for the precise location of position, in place of the conventional surveying methods. Possibly the most used to date is the Shoran radar beacon system which, however, is limited to line-of-sight operation. It is expected that Shoran may be displaced for geophysical use by lower frequency CW systems, such as Decca, Raydist, or Lorac, which give essentially the same location accuracy as Shoran at greater operating ranges.

### Well Logging

The process of making subsurface measurements in bore holes, geophysical and otherwise, is commonly known as well logging. Such measurements are made in holes drilled for water, oil, or other minerals, and in holes drilled for any type of geological exploration. Since the most severe instrumentation problems are encountered in the deep holes drilled for oil, it may be taken hereafter that we are usually talking about this class of bore holes.

A partial list of quantities which are measured in bore holes could include:

*Resistivity (by means of electrodes and alternated d.c. or low-frequency a.c.).

†Resistivity (by electromagnetic means).

Spontaneous potentials (natural potentials occurring in the bore hole).

†Radioactivity.

†Velocity of seismic waves.

Temperature and temperature gradients.

Hole size.

*Hole inclination and direction.

†Magnetic susceptibility.

*Dip of earth formations (amount and direction).

Where:

*Indicates that the equipment may be electronic.

†Indicates that the equipment is always electronic.

No (*) indicates that the equipment is not usually electronic.

Referring to Fig. 1, these measurements are generally made by lowering into the bore hole a cable, containing one or more insulated conductors, on the end of which is attached an appropriate type of apparatus for the measurements to be made. Sometimes, as in the case of standard resistivity and spontaneous-potential logging, the apparatus is simply an array of electrodes mounted on an insulating mandrel. In the case of radioactivity logging, a counter and a certain, not inconsiderable, amount of circuitry is contained in an electronic cartridge which is part of the apparatus in the hole.

Since in oil-well logging the time the drilling rig is idled during the measurements is still costly, it is often economically desirable, in order to speed up the logging process, that the logging apparatus used be capable of making two or more different kinds of measurements, simultaneously or consecutively, with a minimum number of trips in the hole with the cable.

At the surface, connected to the upper end of the cable is the resolving and recording equipment, often mounted on the same truck as that carrying the cable winch, although this may not always be the case. The surface equipment is usually of panel rack construction. A gasoline motor generator furnishes a.c. power and d.c. is provided from batteries or electronic power supplies.

Essentially, then, Fig. 1 represents a telemetering system wherein a sensitive element, which we shall call the logging device, at a depth in a bore hole is connected through the conductors of a cable to the source of power, control, and recorder at the surface.

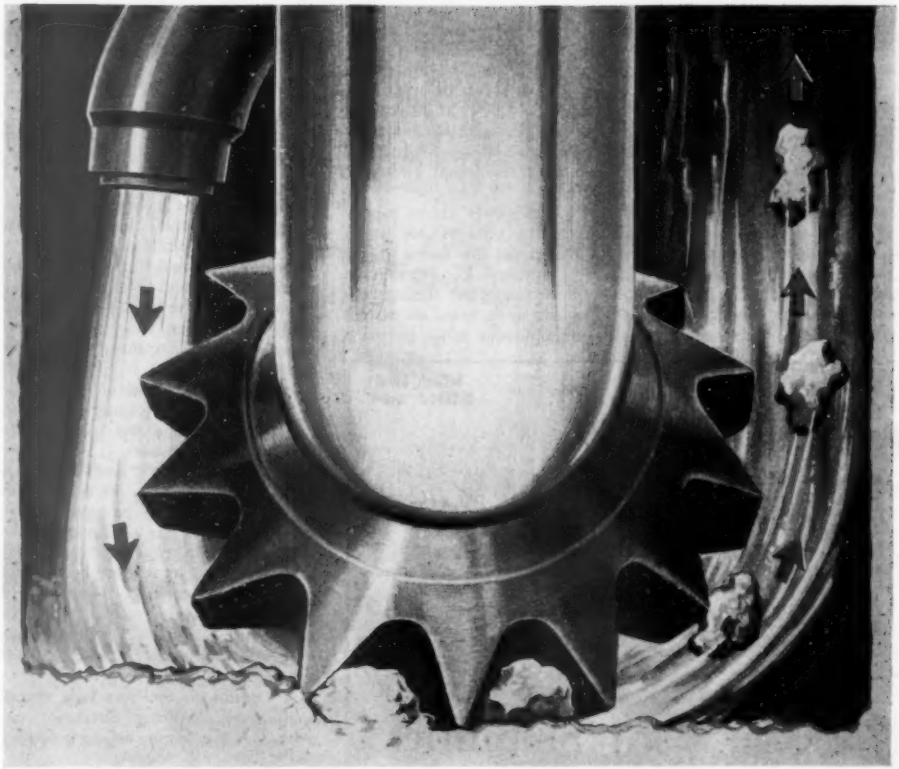
**Demands on cable . . .** The logging cable serves, also, as a measuring line; the length lowered in the hole at any instant gives the depth of the earth formation being logged. For accurate depth measurements, therefore, the cable must be of a type which will stretch very little under the tension of its own weight and the weight of the logging device.

Cables presently used in well logging are predominantly of the armored type, one or more insulated conductors being

**INSTRUMENTATION FOR SURFACE GEOPHYSICAL PROSPECTING***

| TYPE OF MEASUREMENT | QUANTITY MEASURED | INSTRUMENTATION |
|---|---|---|
| Gravity | Variations in force of gravity | Penedulum, or torsion balance, or gravimeter (not electronic except for remote control gravimeter for underwater measurements, which makes use of photoelectric cells) |
| SP (spontaneous potentials) | Natural d.c. potentials existing in the earth | Electrodes, potentiometers |
| Resistivity (by means of electrodes) | Potential drops produced by d.c. or low-frequency a.c. currents transmitted through the earth | Electrodes and potentiometers for measurements with d.c. †Oscillators, amplifiers, and vacuum tube voltmeters in a.c. measurements |
| Resistivity (by means of telluric currents) | Potential drops produced by telluric currents in the earth | Electrodes, †d.c. amplifiers, recorders |
| Resistivity (by electromagnetic methods) | Magnetic fields produced by eddy currents in the earth, which are in turn produced by currents in energizing coils | †Oscillators, coils for energizing and search, amplifiers, and other special circuits |
| Magnetic (standard methods) | Variations in the earth's magnetic field | Dip needle, or magnetic balance, or rotating inductor |
| Magnetic (mobile magnetometer) | Variations in the earth's magnetic field | †Flux-gate type instrument, including oscillator and amplifier |
| Radioactivity | Density of radiations from radioactive substances | †Ionization chambers, d.c. amplifiers, or †Geiger counters, associated circuits, or †scintillation counters, photomultipliers, amplifiers, counting circuits |
| Seismic reflection or refraction | Time for seismic waves to travel from source to detectors while being reflected or refracted in the earth | Geophones, †amplifiers with special AVC, galvanometers, camera. †(Radio used for liaison between shooting party and recording party. Radio somestimes used to relay shot instant to recorder) |

*Thumbnail sketch of the instrumentation used in subsurface methods for the study of geological structure and the location of mineral deposits. †Indicates electronic instrumentation.



# This mud flow pattern makes faster drilling possible

Slush from the nozzles of **REED** Twin-Blast Rock Bits blasts against the bottom of the hole and sweeps across at high velocity — carrying cuttings up into the return mud stream immediately so cutter teeth can work on virgin formation.

The result of this efficient bottom hole cleaning action is faster drilling, more hole per bit, fewer round trips and lower drilling costs.

**REED ROLLER BIT COMPANY**
Houston 1, Texas

contained within the sheathing of usually two layers of steel armor wires. Many cables having a single insulated conductor are in use for special purposes, the return electrical path being through the metallic armor or through the drilling mud and the earth. Cables having six insulated conductors are also in wide use. As with single conductor cables, the cable armor can be used as an additional conductor.

The insulation resistance of each conductor to ground or armor is maintained at a high value, ordinarily 10 megohms or better, and each conductor is rated for voltage stresses across the insulation of a few hundred volts. The distributed capacities existing between conductors, and between conductors and armor, are large (of the order of 1 microfarad for 15,000 ft. of cable), and to a good approximation the cable can be represented at low frequencies in terms of its distributed resistance and capacitance.

Because of the large shunt capacitance, alternating voltages are attenuated in the cable, the more so the higher the frequency. For this reason quantitative measurements through the cable which are to be based on current or voltage amplitudes must be made with direct current or at very low frequencies.

### Additional Circuits

In view of the foregoing, it is desirable to put additional circuits into a hole equipment in order to:

1. Perform complex or multple operations which are otherwise impossible because of the limited number of available cable conductors. For example, it is possible to make multiple use of some cable wires by passing simultaneously over the d.c. and a.c. of different frequencies, which can be separated at the cable terminals by suitable filters. Moreover, it is often possible to put complex control circuits in the hole unit, which, if located at the surface, would require the use of additional cable conductors.

2. Operate high-frequency equipment in the bore hole. Since the cable is inefficient for the passage of high frequencies, they are usually generated in the hole. The resulting signals may be transformed into direct current for passage up the cable, or the magnitude of the readings may be relayed to the surface using a frequency modulation system. Either way, electronic circuits are required.

3. Operate in the bore hole special equipments involving electronic circuits, as, for example, a Geiger counter for radioactivity logging.

### Bore-Hole Logging Devices

Indicated on Fig. 1 are some of the conditions encountered in bore holes which affect the design of the equipment to be lowered into the hole.

Holes drilled for oil commonly range from 6 to 10 in. in diameter, and obviously any logging device must be small enough to enter comfortably the smallest diameter of hole without fear of sticking. Diameters of standard hole equipments range from 3 to 4½ in., with 3⅜-in. (85 mm.) a usual size, and they are of various lengths, depending on the space to be occupied by circuits and other requirements of the apparatus.

A logging device may be made up of several sections joined by pressure-tight couplings, but no one section can be longer than about 10 ft., otherwise it becomes unweildy and too long to be easily transported on the logging truck. It is also desirable that the sensitive part of the device be near the bottom in order to be able to log as close as possible to the bottom of the drilled hole.

Hydrostatic pressures are produced in the hole by the weight of the drilling mud, the purpose of which is to keep in check the natural pressures existing

MODEL 450-A
SIZES: 3" and 4"
THE SPRING-MATIC
OILCO
Simplifies all loading problems
BECAUSE IT HAS GREAT flexibility
in its improved hydraulic and cam design. Simple in operation, compact and sturdy, with a sliding sleeve that may be returned to vertical or semi-vertical position, to permit loading from either side of the rack.
A swing joint allows the dip pipe to hang in vertical position when not in use.
No. 450-A SPRING-MATIC returns upright automatically when raised to horizontal position, and incorporates other features of advantage to insure trouble-free operation.
Interchangeable with weight attachments when specified.
Write NOW for detailed description
OIL EQUIPMENT MANUFACTURING CO.
INCORPORATED
3100 VERMONT AVE., LOUISVILLE, KY.,
Canadian Affiliate: Empire Brass Mfg. Co., Ltd., London, Ontario

# You can't beat *CARBIDE*

## *as your supplier of these chemicals!*

So *many* plants dehydrate or desulfurize natural gas by these methods. Why?—Because you can't beat the initial low cost of the glycol or amine plants—nor their economy and simplicity of operation. If you are constructing a new plant or are replacing, modernizing, or enlarging your present facilities, be sure to consider these glycols and amines!

During 20 years as a supplier to the natural gas industry, we have gathered much experience with these amines and glycols. For information about their properties or use, just call or write your nearest CARBIDE representative. CARBIDE maintains warehouse stocks of these gas-treating chemicals near most of the major gas fields to assure you prompt delivery.

**CARBIDE AND CARBON CHEMICALS COMPANY**

A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

Offices in Principal Cities
In Canada:
Carbide and Carbon Chemicals, Limited, Toronto

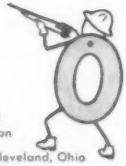
# Rugged ...but SMOOTH

## it's a WICHITA *Air-Tube* clutch!

The rugged, compact construction of a Wichita Air-Tube Disc Clutch assures you continuous service over a long period with very little maintenance.

This clutch is engineered for *smoother* operation, faster engagement and disengagement, cooler running, longer life, easier maintenance, and minimum *SLIPPAGE!*

Take advantage of the BETTER PERFORMANCE! Equip your machines with Wichita Clutches . . . NOW! A Wichita Engineer is available to give you complete Engineering data . . . CALL HIM TODAY!



**WICHITA DISTRIBUTORS**

Brehm-Lahner, Inc., Detroit, Michigan
L. H. Fremont, Cincinnati, Ohio
Pneumatic Power Equipment Co., Cleveland, Ohio
W. G. Kerr Company, Pittsburgh, Pa.
Smith-Keser & Co., West Hartford, Conn.
Smith-Keser & Co., Philadelphia 44, Pa.
Smith-Keser & Co., Westwood, N. J.
Tool & Machinery Sales Co., Buffalo, N. Y.
Frank W. Yarline Co., Chicago, Ill.
Power Rig & Equipment Co., Inc., Long Beach, Calif.
John C. Burge, Inc., Oklahoma City, Okla.
Empire Machinery Company, Odessa, Texas
Empire Machinery Company, Abilene, Texas
Oilfield Motor Service, Alice, Texas
Petroleum Equipment Distributors, Ltd., Edmonton, Can.

Ad 503

on the fluids in the porous earth formations. In the deepest well drilled to date, which was drilled with mud of specific gravity 1.75 to a total depth of 20,521 ft., the bottom-hole pressure is computed to be about 15,000 psi.

To protect the circuits in logging devices from the large hydrostatic pressures, they are encased in thick-walled cylindrical steel housings sealed with suitable pressure-tight gaskets. If the nature of the equipment requires that the pressure housing be nonmagnetic, the pressure housing may be of K monel.

**Size restrictions . . .** The thickness of the pressure housing appreciably reduces the diameter of the space available for circuits. In a 3⅜-in. diameter logging device, for example, no circuit components can be used which are greater than about 2½ in. in diameter. Moreover, there is a strong emphasis on miniaturization and compact arrangement because of the desire to make the equipment do as many things as possible, as well as possible, as rapidly as possible, compatible with the small available space.

Also indicated in Fig. 1 are the high temperatures encountered at great depths in the earth. Although the numerical value varies in different areas, equilibrium earth temperatures increase with depth roughly at the rate of 1° F. every 70 ft. In the 20,521-ft. hole already mentioned the maximum temperature measured was 310° F., which is well above ambient temperatures usually found in electronic applications.

The high temperatures encountered introduce two serious problems for the design of circuits to be used in bore holes:

1. Special emphasis must be placed on temperature compensation of circuits in order that the apparatus will give consistent performance at all depths, and all temperatures, in the bore hole.

2. All components, and circuits, to be used in equipments for deep borehole logging must be heat tested for performance at high temperatures. A single heating of the component, or circuit, is not sufficient; the test must be carried over several cycles of heating and cooling, corresponding to several round trips in the bore hole. As wells are drilled deeper these tests must become more severe. At present, equipment for use in deep bore holes is heat tested at 350° F.

The circuits to be used in deep bore holes must satisfy the requirements of:

1. Small components arranged so as to use efficiently the limited space available.

2. Temperature compensation, where necessary.

3. Temperature ruggedness — they must not fail at elevated temperatures, which in actual cases may also be coupled with conditions of high humidity, since the cartridges sometimes contain small amounts of moisture introduced when they are opened in the field for checks or adjustments under adverse weather conditions.

4. Ruggedness to vibration and shock, mostly incurred during transportation over rough oil-field roads.

In order to satisfy the above requirements, circuit components must be carefully selected. A considerable amount of research has gone into determining what types of components are suitable.

**Vacuum tubes . . .** The least trouble has been experienced with the vacuum tubes. Some tube types give trouble, apparently mostly due to the effects of shock and vibration, but it has always been possible to find equivalent types which would work satisfactorily. The subminiature tubes have proven to be quite rugged, and they, as well as the miniature types, are used a great deal because of the space requirements.

**Insulation . . .** For wire insulation, ordinary rubber is not good, since at

Keep bottom water out of your wells — and prevent costly shutdowns — by tamping Eagle-Picher Lead Wool in the hole. A watertight plug that seals every crack and crevice is made by this finely stranded, flexible metallic wool. Shipped in convenient 50-lb. sacks . . . easy to spot in special cartridge-shaped Eagle-Picher Wire Containers sized to fit all casings. Order through your jobber.

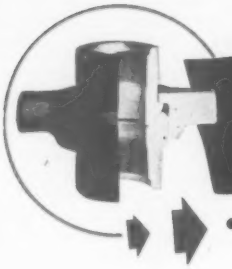
**3 Eagle-Picher Bearing Metals that meet most requirements**

1. **Dreadnaught**—for extreme speed and heavy-duty conditions.
2. **Outlasta**—for medium speed and average-load conditions.
3. **Durable**—for low speed and light-duty conditions.

**THE EAGLE-PICHER SALES COMPANY**

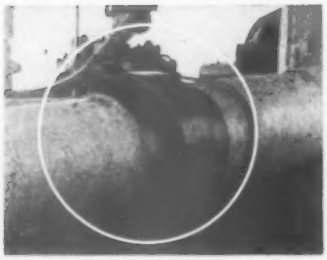
**Since 1843 • Metallic Products Division**
**General Office, Box 777, East Chicago, Indiana**
Cincinnati • Kansas City • East St. Louis • Dallas • Houston
**MEMBER: LEAD INDUSTRIES ASSOCIATION**

EAGLE EP PICHER

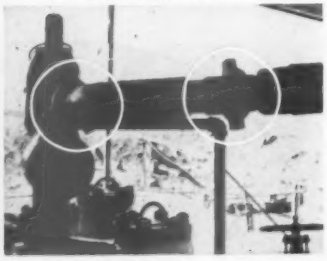


A TOUGH UNION
for Tough Service . . .
. . . . the WECO
FIG. 400

4000 p.s.i. Test
Sizes: 2", 2½", 3", 4", 5½" O.D.,
6", 7" O.D., 8", 10"



The Weco Fig. 400 is ideal for pump suction connections.



Weco Fig. 400 unions save time in connecting up pump discharge lines.

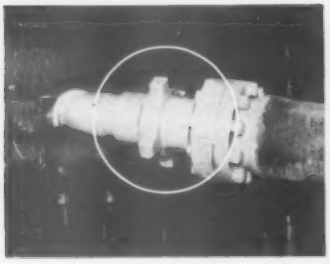
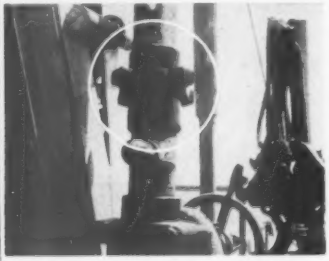


Fig. 400 Union on mud line.



4" Weco Fig. 400 Union on stand pipe.

● Unions in service on drilling rig lines get a lot of rough treatment. These mud, steam, water, oil, gas and other lines are made up and broken out frequently . . . carry fluids at high pressure with lots of vibration. The WECO Fig. 400 Union withstands more abuse in these tough services than any other union. Thicker sub end walls resist distortion . . . provide greater strength with less weight. The famous Weco ball and cone seat assures a perfect seal, every time.

SOLD EXCLUSIVELY THROUGH SUPPLY STORES

*It's Wise to Standardize with . . .* WECO . . .

WELL EQUIPMENT MFG. CORP.
Division of Chiksan Company
HOUSTON 1, TEXAS
CHIKSAN COMPANY
Brea, Calif. · Chicago 28, Ill. · Newark 2, N. J.
CHIKSAN EXPORT COMPANY, Brea, Calif. Newark 2, N. J.

Manufacturers and Distributors of Oilfield, Refining, Marine and Industrial Equipment


high temperatures it becomes brittle and breaks if flexed. The most satisfactory high-temperature wire insulation in present use is Teflon wrapped on the wire and fused.

For terminal strips, phenolic plastics are usually avoided on account of surface leakage under high humidity conditions. Glass-bonded mica is suitable for this use, and also glass laminates bonded by silicone resins. Much use is made of glass beads for feed-through and stand-off insulators.

**Transformers . . .** At high temperatures varnish insulation on transformer windings fails and paper layer separators char. Teflon insulation and glass-base insulation have proven satisfactory for the windings. Between the layers, glass-fiber separators are used. Toroidal transformers are much used since they are economical of space.

**Resistors . . .** Many types of carbon resistors change resistance values radically at the higher temperatures, and not always according to a definite rule. Moreover, they may behave differently on successive cycles of heating and cooling. For low power levels, one brand of resistors, in which a graphite film is sprayed on porcelain, seems fairly reliable. On preliminary tests, the boron-carbon resistors have shown very reliable characteristics under temperature cycling. Wirewound resistors are good, but consume a disproportionate amount of space. Thermistors with negative coefficients are used for temperature compensation.

**Capacitors . . .** Condensers have given considerable trouble, mainly due to the insulation leakage between the plates which develops at high temperatures. Sometimes values of capacitors change as well.

Mica dielectrics are, of course, much superior to paper for high temperatures. Silver mica condensers have been used, but have given some trouble due to the bakelite case cracking, permitting the humidity to affect the insulation.

The newly developed glass dielectric capacitors appear to be the solution to the high-temperature problem for small values of capacitance. They consist of a glass ribbon wound between the metal strips. The whole is contained in a glass case. These capacitors are theoretically perfect and small in size.

Oil-filled condensers give trouble due to temperature expansion of the oil, causing it to leak out of the case. This defect has been overcome by the use of condensers in which the oil has been replaced by a suitable plastic.

MILESTONES IN CAMERON PROGRESS

# How things are "shaping up" at Cameron

In 1946 Cameron Iron Works perfected the closed die method of press-forging relatively large and intricate steel shapes, thus extending the metallurgical advantages of forged steel beyond the realm of small and simple patterns.

Today, most Cameron products are produced by this press-forging process, hence possess qualities of grain structure, homogeneity, and freedom from defects which cannot be produced by any other method.

The field for this unique steel-working process developed by Cameron is unlimited—breech rings for heavy artillery—general industrial equipment—refining—wherever stresses are likely to cause mechanical failure.

Making a press-forging at Cameron

Cameron
IRON WORKS, INC.

*World Leader in Pressure Control*

C. I. W., Inc., P. O. Box 1212, Houston, Texas. Export: 7912 Empire State Bldg., New York, N. Y.

**You wouldn't give your employees this car to drive . . .**

**. . . so don't give him this kind of house to live in . . . Give him a —**

# WHITMOR *distinctive* FIELD HOME
## *and make him a satisfied employee!*

Company pride and prestige is something that every company is concerned about these days — and rightly so — it is one of the secrets of a progressive business. You wouldn't give your employee an old model car to drive because it would reflect on the company. However, some companies are still providing "shot gun" housing for employees — if your company is in this category, then consider these things. (1) Your employees will be happier and do better work if they have a modern home to live in. (2) There will be less turnover in personnel, because today housing is an important item to an employee. (3) You will build prestige, because employees are a company's best salesmen.

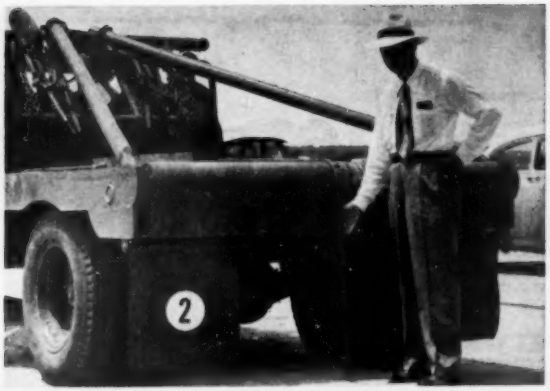
Ask about our Lease-Rental plan whereby you can have the use of Whitmor Homes without actually owning them.

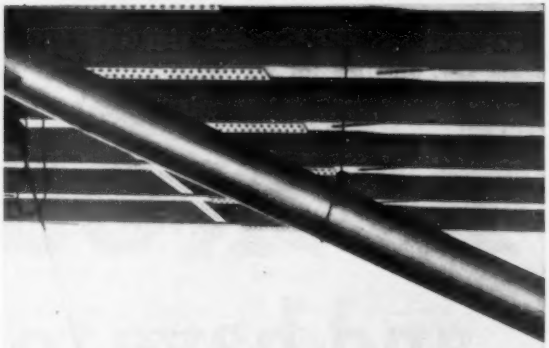
Remember, a man's home is his castle — even in the field. Give your employees the best — give them Whitmor.

**WHITMOR *homebuilders* INC.**

5525 East 15th. Street • Tulsa, Oklahoma
Box 5037 • Phone 6-1137

1. SIDE-BOOM TRACTOR picks up a joint of 18-in. pipe and hauls it to position beneath the west abutment of bridge.





2. WINCH-TRUCK CABLE from top-of-bridge position is lowered through expansion gap to pipe joint on ground. M. J. Peterson, assistant chief engineer, Oklahoma Natural Gas Co., and designer of the line, points to cable.

3. CABLE LIFTS PIPE JOINT from ground position to longitudinal position between central I-beams; welding truck is in foreground and welders' platform at upper left.

NATURAL-GAS PIPE LINE

# "Built-in" Crossing Of Highway Bridge Has New Features

Oklahoma Natural Gas Co. lays 18-in. line on roller pipe hangers between I-beams installed during original bridge construction.

**by Joseph A. Kornfeld**
Mid-Continent District Editor

MANY design difficulties were overcome in the successful completion of an 18-in. natural-gas-distribution pipe line of Oklahoma Natural Gas Co. attached to the new Arkansas River highway bridge at Tulsa.

This bridge, named for its designer, the late Homer X. White of the Oklahoma Highway Department, is the largest in Oklahoma—2,411 ft. in length and 68 ft. in width. It is a part of the new U. S. Highway 66 Tulsa bypass route to the Oklahoma Turnpike now under construction between Tulsa and Oklahoma City.

An important design feature was the necessity of providing for a maximum change of 18-in. in the length of the steel pipe due to a variation of possibly as much as 100° F. in its temperature. This change in length had to be absorbed by the flexibility of the line itself without overstressing, yet had to be contained between fixed anchors in the ground at each end of the bridge without creating a strain on the anchors.

### Engineering Features

• Expansion loops of 270° each comprising an underground 180° U-bend and an upper 90° bend with an intervening 18-ft. arm; all bends lie in a vertical plane. There are two

# When you've stuck your neck out and have to come through

Call Santa Fe

Your Santa Fe freight man knows how to make your hard shipping jobs look easy—and how to handle your common jobs uncommonly well. Call him today—find out how easy it is to *ship via Santa Fe all the way!*

F. H. Rockwell, Gen. Freight Traffic Manager
Santa Fe System Lines
Chicago, Illinois

# DARCOVA

the original composition valve cup

*famous for well pumping efficiency*

**...and low cost, too!**

**1. BEST QUALITY!** The highest standards of quality and performance—backed by 50 years of experience—go into the manufacture of every *Darcova* valve cup, seating cup and ring.

**2. PERFECT FIT!** Consistent uniformity and precision manufacture to fit every size and make pump, assure *Darcovas* to be tops in efficiency of operation.

**3. RIGHT TEXTURE!** Varying conditions of depth, pressure, temperature, fluids and abrasion are not problems when *Darcovas* are used!

Best quality, perfect fit and right composition texture add up to longer, more efficient service...and LOWEST COST!

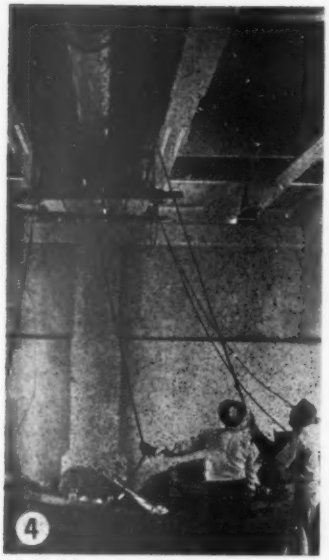
*Be sure to specify DARCOVA at your supply store*

DARLING VALVE & MANUFACTURING COMPANY

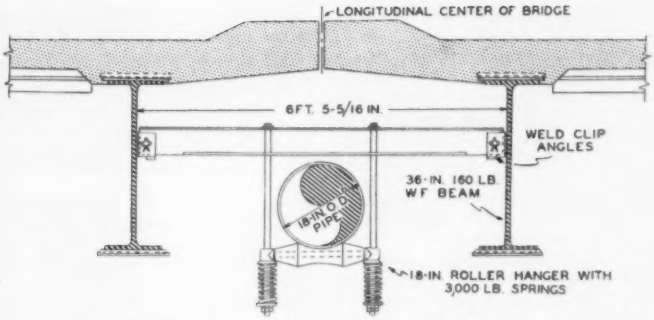
DARCOVA ®

THE ORIGINAL COMPOSITION CUP

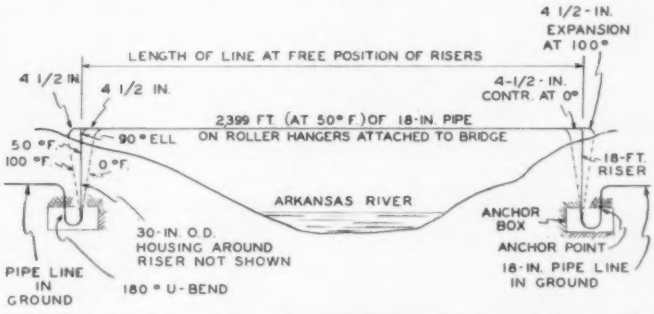
WILLIAMSPORT 1, PA.



**4. READY FOR WELDING, the pipe joint is suspended between central I-beams by overhead winch-truck cable and pivoted by ground crew; stationary welding platform suspended from I-beams shown in background.**


LONGITUDINAL CENTER OF BRIDGE
6FT. 5-5/16 IN.
WELD CLIP ANGLES
36-IN. 160 LB. WF BEAM
18-IN O.D. PIPE
18-IN ROLLER HANGER WITH 3,000 LB. SPRINGS

**TRANSVERSE SECTION DETAIL shows how pipe-line roller hangers are suspended from crossbeam welded between two central I-beams of bridge.**



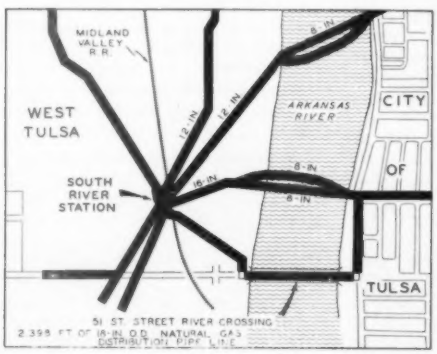

**SCHEMATIC DIAGRAM showing arrangement of buried 270° expansion loops and method for allowance for maximum elongation of 18 in. of pipe length in possible temperature range of 100° F.**

loops, one at each end of the bridge.

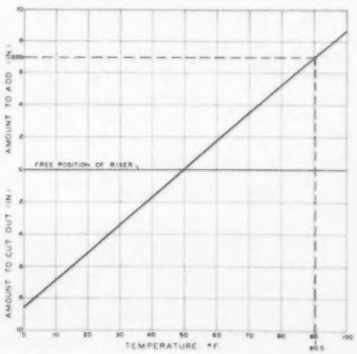
- A new type of expansion anchor in the form of an underground, reinforced-concrete box, which, together with a 30-in. vertical pipe, anchors and houses the expansion loop near each abutment.
- Radiographic inspection of complete pipe welds.
- Installation of suspended, spring-mounted roller pipe hangers between I-beams during original construction of the bridge.
- A pipe-installation technique involving the raising of each joint of pipe from the ground to hanger level, suspension of each joint from a winch truck on top of the bridge by means of a cable lowered through an expansion gap separating the bridge roadways.
- Pushing of consecutive joints forward from one end of the bridge to the other side on the hanger rollers as pipe installation progressed.
- A welder's scaffold suspended beneath the bridge near one end and welding of each joint after it is moved forward to the welder's platform.
- A weld-cleaning and painting platform suspended from the bridge beyond the welding platform to insure a complete coat of aluminum paint over the pipe following each welding operation.

### Engineering Background

The design employed in the construction of the pipe line across the Arkansas River at Tulsa is the result of a backlog of 14 years of design and installation experienced in river crossings of this type on highway bridges. Back in 1938, Oklahoma Natural Gas Co. made its first installation of this type; that bridge lies across the Ar-




**DISTRIBUTION PIPE LINE map of Oklahoma Natural network in vicinity of the Fifty-first Street river crossing over the Arkansas River described in this article.**




**ADJUSTMENT CURVE showed that 6.95 in. of pipe was required to be added to the pipe line to take care of temperature effects on elongation of 18-in. pipe line. At 59° F. both risers are in vertical position in a position of no strain from flexure.**

kansas River at Bixby on U. S. Highway 64.

Due to the unusual size and nature of the Arkansas River bridge at Tulsa, the conventional design was not applicable, i.e., the use of an expansion arm extending to the side from the bridge at either end, commonly known as a Z-bend.

Factors in bridge design which led to the selection of the piping design currently employed include: (a) bridge width, (b) proximity of interchange roadways beneath the bridge at either end, and (c) overhead clearance requirements.

**Location . . .** The bridge to which the pipe line is attached is located on Fifty-first Street along an east-west direction over the Arkansas River in the south part of the city limits of Tulsa (see Fig. 1). Comprising the largest four-lane highway bridge in the State of Oklahoma, it has a length of 2,411 ft. and a width of 68 ft. The two 27-ft. concrete roadway slags are separated by a 4-ft. curb longitudinally bisected by a 1-in. gap to allow for lateral expansion and contraction. At both bridge edges are sidewalks 4 ft. in width. Of steel-and-concrete construction, the bridge contains twenty-four 36-in. I-beam stringers, in 400-ft. continuous sections, supported on piers at 100-ft. intervals.

### Pipe-Line Data

**Specifications . . .** The bridge-supported pipe line consists of 2,348-ft., or 47 joints, of new 18-in. o.d. A.P.I.-5L Grade B, ¼-in. wall, electric weld 47.39-lb. pipe, and 86 ft. of new seamless ⅜-in. wall 70.59-lb. pipe. This heavier weight pipe is used at either end of the bridge where it is subject to stress from flexure. Pipe joints average 50 ft. in length.

A total of 119 hangers were required for supporting the pipe on the bridge, spaced at approximately 20-ft. intervals. Details of pipe-hanger supports are shown in an accompanying figure. It uses a roller hanger assembly with 1,500-lb. spring cushions on 1⅛ by 40-in. hanger bolts. These were suspended from 6-in. by 4-in. by 6-ft. hanger beam angles which were bolted to the two center 36-in. 160-lb. I-beam bridge roadway stringers by means of slotted clip angles welded on.

### Construction Procedure

Nearly all of the pipe installation and welding was conducted from the west bank of the river, near South Elwood Avenue and West Tulsa, as shown in the photographs. A pipe rack was set up 100 ft. south of the bridge for handling 47 joints of 47.39-lb. pipe and two partial joints of 70.59-lb. pipe.

The following steps trace the pipe-laying and welding processes:

**1. Picking up pipe . . .** Pipe was moved from the rack by a side-boom tractor with pipe sling to a position directly beneath the west end and in longitudinal alignment with the bridge center line.

**2. Raising pipe to welding position . . .** Pipe suspension cable was lowered from the rear end of a winch truck driven onto the top of the bridge and straddling the 4-ft. median strip or center curb which contains the 1-in. expansion gap.

Each pipe joint was raised to a position immediately under the median strip which is halfway between the center I-beams. Alignment was then made longitudinally so that the welded pipe would pass over each of a series of roller hanger assemblies by means of the overhead suspension cable, and a second hold-down cable controlled on the ground by two workmen.

**3. Welding operations . . .** A welding truck was driven into operating position beneath the bridge and a suspension-type welding scaffold erected immediately beneath the west end of the bridge.

**4. Moving line forward . . .** After each weld was completed, all the welded pipe was moved forward over the roller hangers under the bridge until the end was cleared for making the next weld. The next joint was then hauled from the pipe rack to a position beneath the bridge by the side-boom tractor, raised to welding position by the overhead suspension cable and welded to the previous joint. The suspension cable was left around the joint and the winch truck on the bridge driven forward, pulling the growing pipe line forward under the bridge.

**5. Spacing of pipe welds . . .** Locations of all hangers had been "plussed in" by survey stations beginning with 0+00 at a fixed point on the far end of the bridge and extending westward toward the installation area on the west bank. Likewise, before installation, each pipe joint end was plussed in, beginning on the east end of the welded line at a point which would coincide with the fixed point when the line was finally rolled into its permanent longitudinal position.

Full pipe lengths or "pup" joints were chosen by length for order of installation as determined by comparison of the future "survey station plus" of the joint ends with that of the hangers. Thus it was possible to control the final location of all welds such that none would be within a minimum of 2 ft. from the hanger. This was done in order that, in operation, the welds would not hinder free movement of the pipe over hanger rollers during thermal expansion and contraction.

**6. Painting welded joints . . .** A painting scaffold was erected beneath the bridge similar to the welding platform 50 ft. east of or beyond the welding platform. Here the paint at the weld zone was replaced. Thus as each new joint was welded at the welding platform, the previously welded joint was painted 50 ft. toward the river.

**7. Welding line to west expansion loop . . .** At the western terminus, a part joint of 18-in. o.d. 70.59-lb. seamless Grade B pipe was welded to the main pipe line; this compares with the 47.39-lb. weight used for the line proper. The heavier pipe then was welded to an 18-in. standard 90° long-radius welding ell which in turn was welded to the heavy pipe riser extending from the U-bend in the anchor box designed for that purpose. From this junction, the distribution line extends 1,430 ft. to a cutoff valve located at the South River compressor station where an operator is constantly available in case an operating emergency should arise.

**8. Welding line to east expansion loop . . .** The eastern terminus is at the intersection of the bridge with South Riverside Drive.

As in the case of the western terminus, the same procedure in welding a part joint of 70.59-lb. pipe to the 47.39-lb. main line was followed. Likewise, the heavier joint was welded to an 18-in. standard 90° welding ell which in turn was welded to the riser from the anchor box. On the pipe-line side of the U-bend, made up of two 90° welding ells, the line passes upward through and is anchored by being welded to an 18⅜-in. o.d. by 17-in. by ⅜-in. wall steel sleeve embedded in the top of the anchor box. At this point the line emerges from the anchor box with another 90° ell to join an 18-in. distribution line extending northward to the former eastern terminus of the buried river crossings. Before this junction is reached, the line passes through an 18-in. underground plug valve.

**9. Radiographic inspection welds . . .** Pictures of completed pipe joint welds were taken on X-ray film by directing gamma rays from a radioactive cobalt source through the walls of adjacent joints of pipe so as to include the weld between.

Since most of the pipe was in place before welding, access for nearly all

*(Continued on page 172)*

*Designed for Extra Comfort, Made for Long, Hard Wear*

# GOODALL

## CLOTHING AND BOOTS

A long-standing reputation for quality, comfort and economy recommends Goodall clothing and footwear as your first choice for all plant and laboratory needs.

COATS, JACKETS, OVERALLS — A variety of styles, in rubber or neoprene, with refinements in detail that mean *extra* value.

GLOVES—Made of high-quality rubber or Vinylite. A type for every service.

### "TOE SAVER" ® BOOTS . . .

The ultimate in protective footwear—famous for comfort, durability and the positive protection provided by the flanged steel safety toe box, tested to withstand 2,000 lbs. pressure. Grid-tread soles are long-wearing and guard against slipping on wet surfaces. Short, three-quarter and full-hip lengths.

*Contact Our Nearest Branch for Complete Information and Prices*

**GOODALL RUBBER COMPANY**

GENERAL OFFICES, MILLS and EXPORT DIVISION, TRENTON, N. J.

Branches: Philadelphia · New York · Boston · Pittsburgh · Chicago · Detroit · St. Paul · Los Angeles · San Francisco · Seattle · Portland · Salt Lake City · Denver · Houston · Distributors in Other Principal Cities

Est. 1870

It's called Alcoa Utilitube*. If you use coiled tube, Alcoa Utilitube may very easily cut your tube costs by 40%.

Use it where corrosion is a hazard . . . for fuel and lube lines . . . for hydraulic fluids . . . for air and refrigerants. It will not gum or sludge in petroleum service nor will it discolor or contaminate the fluids it carries.

Forming, flaring and bending are as easy as with annealed copper . . . and Alcoa Utilitube work hardens less. At sub-zero temperatures it actually gets stronger.

Aluminum tube fittings are available from leading tube fitting distributors. For complete information, write for the new booklet, ALCOA UTILITUBE.

**ALUMINUM COMPANY OF AMERICA**
839-K Gulf Bldg. · Pittsburgh 19, Pennsylvania

*®

# WHELAND

**HP-8000 7¼" x 12"**
delivers 577 GPM at 555 PSI with 7¼" liners to 322 GPM at 995 PSI with 5½" liners at 70 RPM.

***220 INPUT HORSEPOWER***

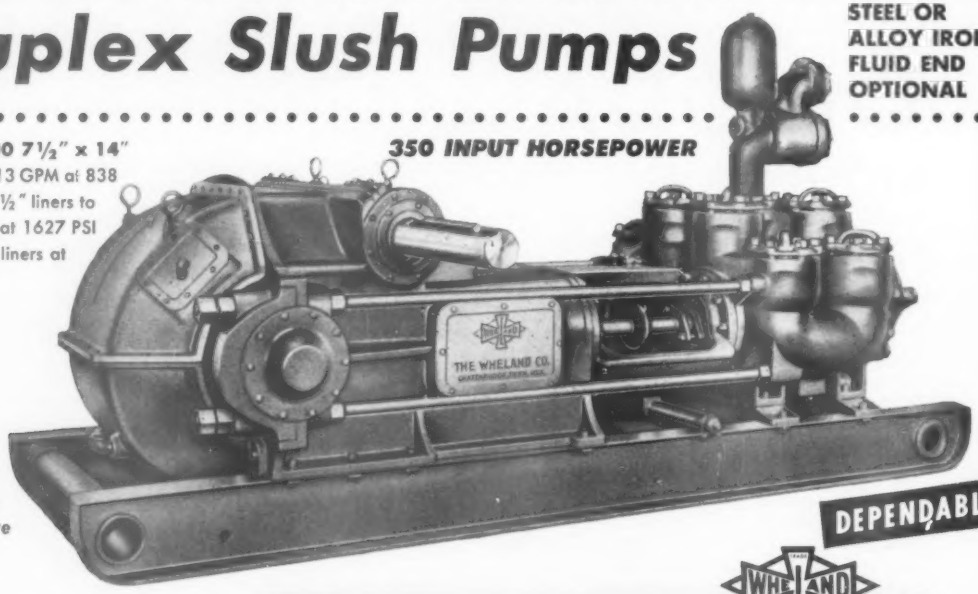
**MORE PRESSURE—MORE MUD**

## Duplex Slush Pumps

**STEEL OR ALLOY IRON FLUID END OPTIONAL**

**HP-14000 7½" x 14"**
delivers 613 GPM at 838 PSI with 7½" liners to 316 GPM at 1627 PSI with 5½" liners at 60 RPM.

***350 INPUT HORSEPOWER***




***Write for descriptive bulletin***

**DEPENDABLE**

# WHELAND

THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.
*ROTARY DRILLING MACHINERY*

DRAWWORKS • SLUSH PUMPS
ROTARIES • CROWN BLOCKS
TRAVELING BLOCKS • SWIVELS

*DOMESTIC DISTRIBUTORS & THEIR HEADQUARTERS:* Jones & Laughlin Supply Co., Tulsa, Oklahoma • Houston Oil Field Material Co., Inc., Houston, Texas
Iverson Supply Co., Tulsa, Oklahoma • Lucey Products Corporation, Tulsa, Oklahoma • Superior Iron Works & Supply Co., Inc., Shreveport, Louisiana
*EXPORT DISTRIBUTOR:* Lucey Export Corporation, 233 Broadway, New York 7, New York—Broad Street House, London E. C. 2, England

# *Performance of*

# Power Pumps in 700 Hydraulic Horsepower Class

by Earle C. Hellums*

**EDITOR'S SUMMARY: Power pumps in the 700 hydraulic horsepower class satisfy present requirements for deep drilling. Economies can be effected by reducing drilling time at all depths; drilling rates are approximately proportional to the hydraulic horsepower applied if:**

**1. Liner size and pump speed are selected to provide an adequate annular return velocity.**

**2. All hydraulic horsepower available for circulation, above that needed for annular velocity requirement, is used to increase pressure differential across the bit nozzles.**

**This increase in the energy of the fluid jet stream is accomplished by using the smallest size bit nozzles that the available horsepower will permit. The size of the bit nozzles must be increased as drilling progresses deeper, because the pressure losses inside of the drill stem increase with depth.**

## INTRODUCTION

THE hydraulic horsepower requirements of a drilling rig have increased tremendously during the past few years. Deeper drilling and the economic necessity of faster drilling are responsible for these increased requirements. New methods and new techniques have made it possible to utilize larger pumps that are capable of delivering 700 hydraulic horsepower and effect economies by doing so.

Requirements for increased hydraulic horsepower on steam rigs can be accomplished by operating mud pumps in series, and by adding boilers if necessary. In the case of engine-driven rigs using power pumps the problem is not so easy. Until recently the available power pumps were not of sufficient size to deliver the desired hydraulic horsepower when operated singly.

Experience has indicated that it has not been satisfactory to operate power pumps in series for any length of time. (It is understood that one company has recently been successful in operating power pumps in series.) In recognition of the need for a larger pump, manufacturers now have available power pumps that will deliver 700 hydraulic horsepower. Pumps of this type have been used in the Gulf Coast, West Texas, Wyoming, California, and South America. It is regrettable that complete data are not available from a number of areas where these large power pumps have been used.

This paper presents data obtained from wells drilled in the Gulf Coast area showing results that have been accomplished with pumps capable of delivering 700 hydraulic horsepower.

## Discussion

The required capacity of the mud pump for a drilling rig is determined by the maximum hydraulic horsepower requirement of the mud-circulating system, which depends upon the volume to be circulated and the pressure required to circulate such volume.

The volume circulated should be large enough to produce an annular return velocity that is adequate to efficiently remove cuttings from the hole. Some operators prefer to maintain annular velocities as high as 175 ft. per minute, whereas others are of the opinion that a velocity of 125 ft. per minute may be adequate.

The pressure required is the result of four principal elements of the rig circulating system, which are as follows:

1. Friction losses through the inside of the drill pipe and drill collars.

2. Friction losses in the annulus between the well bore and the outside of the drill string.

3. Friction losses through the surface connections, including the mud lines, stand pipe, hose, swivel, kelly, etc.

4. Pressure drop across the bit nozzles.

**Drill string losses . . .** The friction losses through the inside of the drill string increase rapidly as the volume circulated is increased. Due to this fact careful consideration should be given the volume to be circulated. If the volume is larger than required, the pressure required will be much larger than necessary, which will result in a waste of hydraulic horsepower.

The following example will illustrate the effect of increased volume on the friction losses in the drill pipe and on the hydraulic horsepower required:

It requires 305 hydraulic horsepower to circulate 500 g.p.m. through 12,000 ft. of 4½-in. drill pipe because of the 1,044-psi. friction loss. Five hundred and thirty hydraulic horsepower is required to circulate 600 g.p.m. through the same drill pipe, because of a friction loss of 1,512 psi., which is an increase of 468 psi.

The friction losses through the annulus and through the surface connections are important, but they are relatively small compared to the drill-pipe losses. The pressure drop across the bit nozzles will vary according to the size of the nozzles used; however, this pressure drop imparts energy to the bit fluid jet stream, which has a direct effect on the drilling rate.

Under conditions of maximum effective bit weights and optimum rotary speeds, the drilling rate of a blade bit or rock bit is dependent upon the ability of the fluid jet stream to do work, i.e., disintegrate the cuttings, keep the bit clean, and scour the bottom of the hole. The ability of the fluid jet stream to do work depends upon the energy contained therein, which is the product of the volume circulated and the velocity of the jet stream.

As has been pointed out in other papers, an increase in the energy of the fluid jet stream can best be obtained by increasing the velocity rather than the volume. This is done by using the smallest size bit nozzles that the available hydraulic horsepower will permit while

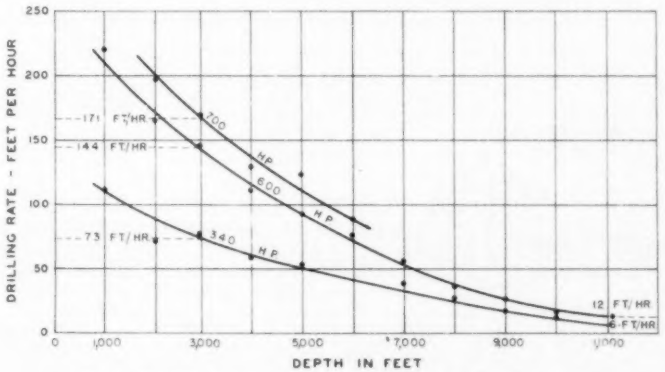



Fig. 1—Hydraulic horsepower study of wells drilled in South Louisiana

*Vice president, Cron & Gracey Corp., Houston.

circulating a sufficient volume to give the required annular velocity.

**Drilling records . . .** Drilling records on a number of wells in various areas where the rigs were equipped with 700-hp. pumps were studied, but most of the data were not complete and an analysis could not be made. Complete data were available on the wells listed in Table 1, and a comparison is made showing the effect of pump horsepower.

The first comparison covers the interval drilled from 3,500 to 8,200 ft. in three wells. There was 438 hydraulic horsepower used to drill Well No. 1. The hydraulic horsepower was increased on Well No. 2 to 550, which resulted in an increase of 35.9 per cent in footage per bit and a 32.2 per cent increase in the drilling rate, thereby saving 24 drilling hours.

The hydraulic horsepower was increased to 691 on Well No. 3. As compared to Well No. 2, the result was an increase of 24.5 per cent in footage per bit and an increase of 24.3 per cent in the drilling rate, which saved 17 hours' drilling time.

The second comparison covers the interval drilled from 8,000 to 10,500 ft. in four wells. There was 490 hydraulic horsepower used to drill Well No. 1, where conventional rock bits were run. The hydraulic horsepower was approximately the same on Well No. 2; but jet drag bits and jet rock bits were run, which resulted in an increase of 12 per cent in the drilling rate, thereby saving 21 drilling hours.

On Well No. 3, the hydraulic horsepower was increased to 525, which resulted in an increase of 32.9 per cent in footage per bit and an increase of 6.7 per cent in the drilling rate, thereby saving 9 hours' drilling time, as compared to Well No. 2. On Well No. 4 the hydraulic horsepower was increased to 606, which resulted in a further increase of 7.1 per cent in footage per bit and an increase of 30.6 per cent in the drilling rate, compared to Well No. 3, saving 22 drilling hours.

**The comparative drilling data definitely indicate that each increase in the hydraulic horsepower results in a corresponding increase in the drilling rate.**

**Louisiana drilling . . .** A study of deep-well drilling in South Louisiana showing the effect of hydraulic horsepower on the drilling rate is presented in Fig. 1. The curves are based on data obtained from wells drilled by one operator in that area. Maximum effective bit weights were applied and optimum rotary speeds based on the driller's experience were used.

Definite drilling rates for depths from 1,000 to 11,000 ft. are shown for 340 and 600 hydraulic horsepower. Drilling rates for depths from 2,000 to 6,000 ft. are shown for 700 hydraulic horsepower. There were no data available for 700 hydraulic horsepower below 6,000 ft. The study indicates that the drilling rate is approximately proportional to the hydraulic horsepower applied, each increase in hydraulic horsepower resulting in a corresponding increase in the drilling rate.

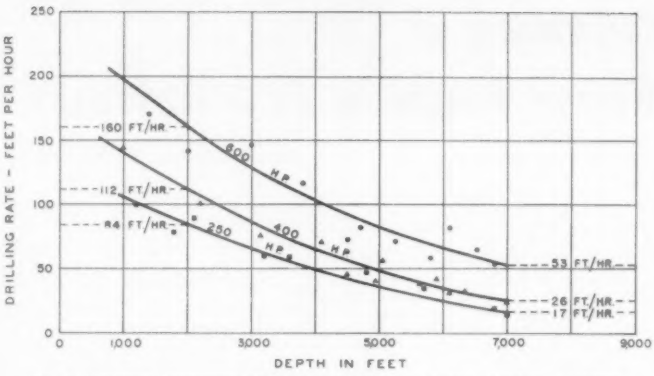



**Fig. 2—Hydraulic horsepower study of wells drilled at Golden Meadow, Louisiana.**

Fig. 2 was prepared from data obtained from wells drilled in Golden Meadow field in South Louisiana. Definite drilling rates for depths from 1,000 to 7,000 ft. are shown for 250, 400, and 600 hydraulic horsepower. This study also shows the benefit that can be derived from the use of a pump capable of large hydraulic horsepower output.

It is hoped that in the future operators will record complete drilling data so that studies can be made of the performance in all areas. All of the companies using these large pumps, even though they do not have complete data, report that they are pleased with the results accomplished to date.

The over-all cost of operating large pumps is more than the cost of operating small pumps, but the advantages of the large pumps, such as an increase in the drilling rate and usually an increase in footage per bit, greatly outweigh the added cost.

### Application

1. Select liner size and pump speed to provide an adequate annular return velocity.

2. Utilize all of the hydraulic horse-

**TABLE 1—COMPARISON OF DRILLING DATA SHOWING THE EFFECT OF PUMP HORSEPOWER**

| Location— | Well No. | Average hydraulic hp. | Average circulating rate, g.p.m. | Number and type bits* | Total ft. drilled | Average ft. per bit | Increase in footage per bit, per cent | Average drilling rate, ft. per hour | Increase in drilling rate, per cent | Drilling time saved, hours |
|---|---|---|---|---|---|---|---|---|---|---|
| **Interval 3,500 to 8,200 ft.** | | | | | | | | | | |
| SOUTH LOUISIANA: | | | | | | | | | | |
| Terrebonne Parish | 1 | 438 | 540 | 6 JD | 4,095 | 683 | | 41.4 | | |
| | 2 | 550 | 540 | 3 JD<br>2 JR | 4,641 | 928 | 35.9 | 54.7 | 32.2 | 24 |
| | 3 | 691 | 620 | 4 JD | 4,620 | 1,155 | 24.5 | 68.0 | 24.3 | 17 |
| **Interval 8,000 to 10,500 ft.** | | | | | | | | | | |
| SOUTH LOUISIANA: | | | | | | | | | | |
| Terrebone Parish | 1 | 490 | 525 | 10 CR | 2,423 | 242 | | 13.2 | | |
| | 2 | 485 | 505 | 7 JD<br>3 JR | 2,335 | 234 | | 15.0 | 12.0 | 21 |
| | 3 | 525 | 528 | 1 JD<br>5 JR<br>1 CR | 2,178 | 311 | 32.9 | 16.0 | 6.7 | 9 |
| | 4 | 606 | 520 | 7 JD | 2,334 | 333 | 7.1 | 20.9 | 30.6 | 22 |

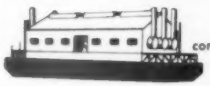
*JD—Jet drag; JR—Jet rock; CR—Conventional rock.

Levingston

BUILDS FINE SPECIALIZED MARINE EQUIPMENT FOR THE PETROLEUM INDUSTRY

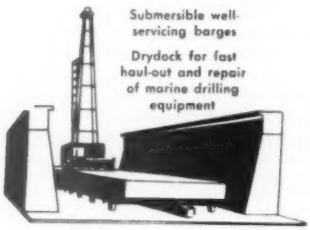
Submersible drilling barges

Tugs



Boiler and compresser barges

Water, oil, and supply barges



Submersible well-servicing barges

Drydock for fast haul-out and repair of marine drilling equipment

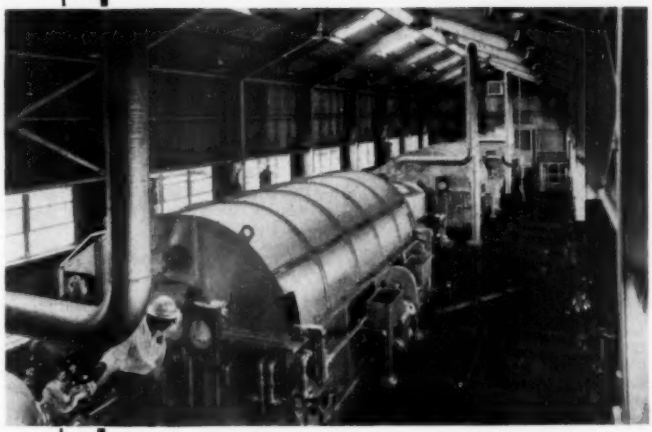
Levingston is not only located conveniently with respect to marine drilling operations on the Gulf Coast, but here you will find marine engineers and constructors who understand the language of oil operators. Bring your marine petroleum equipment problems to Levingston *first* for a quick economical solution.

Levingston

SHIPBUILDING CO.

Orange, Texas

4 different jobs for these Three OLIVER PRECOATS



1 . . . Refining Slop Oils and Emulsions consisting of a blend of Separator Skimmings, Crude Tank Bottoms and Cracking Oil Slop

2 . . . API Separator Bottoms

3 . . . Flocculation Sludge from Treatment of Refinery Chemical Wastes

4 . . . Acid Oil from Treatment of Refinery Chemical Wastes

The filter assigned to handle the Acid Oil with its pH near 2 is of solid monel construction. The other two filters are stainless steel. All three are 8' diameter x 16' long.

No better example of Oliver Precoat Filter versatility can be found than in this 4-way job. The filter has proved itself not only here but in other installations to be *the* unit for handling the various refinery wastes. It has capacity. It has efficiency. It has durability . . . and it has back of it 45 years of filtration experience gained in every division of the process industry, including the refining of petroleum.

NEW YORK 36 – 33 West 42nd Street • CHICAGO 1 – 221 North LaSalle Street
OAKLAND 1 – 2900 Glascock Street • SAN FRANCISCO 11 – 260 California Street

FACTORIES Hazleton, Pa. Oakland, Calif.

OLIVER UNITED FILTERS DUF INC.

WORLD WIDE SALES, SERVICE AND MANUFACTURING FACILITIES

**Direct Representation**

WEST INDIES
Wm. A. Powe
Havana, Cuba

CANADA
E. Long, Ltd.
Orillia, Ontario

MEXICO & CENT. AMERICA
Oliver United Filters Inc.
Oakland, Calif.

HAWAIIAN ISLANDS
A. R. Duvall
Honolulu

PHILIPPINE ISLANDS
E. J. Nell Co.
Manila

AUSTRALASIA
Hobart DuR Pty., Ltd.
Melbourne

**Representation through The Dorr Company and Its Affiliates**

EUROPE, NORTH AFRICA & INDIA
Dorr-Oliver S. A. Brussels
Dorr-Oliver S.N.a.R.L. Paris
Dorr g.m.b.h. Wiesbaden (16)
Dorr-Oliver Co., Ltd. London, S.W. 1
Dorr-Oliver S.a.R.L. Milano
Dorr-Oliver, N.V. Amsterdam-C
Dorr-Oliver (India) Ltd., Bombay

SOUTH AMERICA & ASIA
The Dorr Co.
Stamford, Conn.

SOUTH AFRICA
E. L. Bateman Pty., Ltd.
Johannesburg, Transvaal

"SERV-RITE"

Insulated Thermocouple Wire Extension Lead Wire

FOR

PLATINUM COUPLES
CHROMEL ALUMEL
IRON CONSTANTAN
COPPER CONSTANTAN
IRON CUPRONEL

No matter what your wire or insulation requirements may be, you can depend on Gordon "Serv-Rite" insulated wire for pyrometers—recognized as a standard of highest quality for nearly half a century. All "Serv-Rite" wire is now manufactured in the new, completely modern Gordon plant, employing up-to-date equipment and machinery, supervised and operated by skilled technicians—your guarantee of continued precision quality. In addition to maintaining large stocks of all common types of wire, Gordon will manufacture special insulation, in long or short runs, to suit your individual needs and meet your most rigid specifications.

All Types of Insulation

Felted Asbestos
Asbestos Braid
Weatherproof Braid
Glass Braid
Polyvinyl Plastic
Nylon Braid
Stainless Steel Armored Braid
Silicone Treated
Cotton Braid
Lead Jacket

The home of "SERV-RITE"

Full Particulars on Request

4229

GORDON SERVICE

CLAUD S. GORDON CO.

Manufacturers & Distributors

Thermocouple Supplies • Industrial Furnaces & Ovens
Pyrometers & Controls • Metallurgical Testing Machines

Dept. 29 • 3000 South Wallace St., Chicago 16, Ill.
Dept. 29 • 2035 Hamilton Ave., Cleveland 14, Ohio

power available for circulation, above that needed for the annular velocity requirement, to increase the pressure differential across the bit nozzles. This increase in the energy of the fluid jet stream is accomplished by using the smallest size bit nozzles that the available horsepower will permit. The size of the bit nozzles must be increased as drilling progresses deeper, because the pressure losses inside of the drill stem increase with depth.

3. Some of the limiting factors in the application of this principle, other than the horsepower capacity of the pump, are the maximum pressure the operator wishes to place on the surface equipment and drill pipe, and the maximum pressure drop that the bit and nozzles are able to withstand without washing out.

### Conclusions

Power pumps in the 700 hydraulic horsepower class satisfy present requirements for deep drilling, and are effecting economics by reducing drilling time at all depths. It is possible that most of the operators in the Gulf Cost area using pumps of this size are not taking full advantage of the principle mentioned in this paper.

A very careful study of all the factors involved, such as liner size, volume of mud circulated, pressure losses, and bit nozzle size, is important to obtain all the potential advantages of large pumps.

### Acknowledgment

Part of the information used in this paper was taken from a paper presented by the author at the Shreveport meeting of the Southwestern District, American Petroleum Institute, March 5-6, 1952.

### References

1. Nolley, J. P.; Cannon, George E.; and Ragland, Douglas: The Relation of Nozzle Fluid Velocity to Rate of Penetration With Drag-Type Rotary Bits, Drilling and Production Practice, 23 (1948).

2. Nolley, J. P.; Cannon, George E.; and Ragland, Douglas: Results Obtained With High Nozzle-Fluid Velocity Rotary Bits, The Drilling Contractor, 5 (2), 60, Feb. 15 (1949).

3. Eckel, John R. and Nolley, J. P.: An Analysis of Hydraulic Factors Affecting the Rate of Penetration of Drag-Type Rotary Bits, Drilling and Production Practice, 9 (1949).

4. Bielstein, W. J., and Cannon, George E.: Factors Affecting the Rate of Penetration of Rock Bits, Drilling and Production Practice, 61 (1950).

5. Payne, L. L., and Nolley, R. H.: Use and Advantages of Jet-Nozzled Rock Bits, The Petroleum Engineer, reference annual, 1952.

6. Willke, H. L.: Mud-Pump Selection, A.S.M.E., Paper No. 49-PET-14, Petroleum Mechanical Engineering Conference, Oklahoma City, Oct. 1949.

7. Hellums, Earle C.: The Effect of Pump Horsepower on the Rate of Penetration, Southwestern Distrit A.P.I. Division of Production Meeting March 1952, Shreveport.

## "Built-in" Crossing

*(Continued from page 166)*

radiograph exposures was from the painting platform or by means of a long extension ladder.

### Calculating Elongation

The line pipe has a thermal expansion coefficient of about ¾ in. per 100 ft. per 100° F.

The problem of compensating for pipe elongation due to above-neutral temperature was solved in the following manner:

The line was welded to the west expansion loop while the latter was in a position of no strain from flexure. To tie in at the east side, the temperature of the bridge pipe was taken and, at the time of tying in, found to be 90.5° F. on a day in early August.

The proper amount of pipe to be added to that on the bridge beyond that indicated for exact tiein to the unstrained east loop was determined from the curve shown in an accompanying chart so that actual length and strain conditions would be what they were calculated to be at the existing pipe temperature. Theoretically, when the temperature of the pipe line (affected by both the outside air and the gas within) is 50° F. there will be no bending stress in the expansion loops and both risers will be in a free vertical position.

The actual amount of pipe required to be added was found from the chart to be 6.95 in.

**Inspection and testing . . .** All pipe was tested at the mill according to A.P.I.-5L specifications and inspected on the job before installation. Welders were given the standard qualification tests for competency. The completed pipe line was pressure tested with air at 100 psi. for a period of 8 hours.

### Acknowledgment

Thanks are expressed to the management of Oklahoma Natural Gas Co. for permission to publish this article. Construction was supervised by H. J. Byrd, assistant distribution superintendent, and engineers A. A. Phillips and J. D. Kelley, all of Oklahoma Natural Gas Co., Tulsa. Pipe installation was performed under contract by Harper Construction Co., Turley, Okla. Hanger and anchor installation was done under separate contract by Gillioz Construction Co., Monett, Mo., general contractor on the entire bridge. Thanks are due for the cooperation shown by engineers and officials of the Oklahoma Highway Commission of Oklahoma City and the U. S. Bureau of Public Roads, Washington, D. C.

# Physical Properties of Important Petrochemical Materials

| Type of compound | Complete name— | Hydrogen (%) | Carbon (%) | Boiling point (°F.) | R.v.p. (psi.) | Latent heat of evap. B.t.u./lb. | Freezing point (°F.) | Heating value B.t.u./lb. | At 68° F. B.t.u. per U. S. gal. | At 68° F. Specific gravity | At 68° F. Weight per U. S. gal. (lb.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Paraffin | Methane | 25.1 | 74.9 | —259 | . . . | 219 | —296 | 21,500 | . . . | Gas | Gas |
| Paraffin | Ethane | 20.0 | 80.0 | —128 | . . . | 210 | —298 | 20,400 | . . . | Gas | Gas |
| Paraffin | Propane | 18.3 | 81.7 | — 44 | . . . | 183 | —306 | 19,800 | . . . | Gas | Gas |
| Paraffin | Normal butane | 17.3 | 82.7 | 31 | . . . | 165 | —217 | 19,500 | 94,000 | 0.580 | 4.83 |
| Paraffin | Isobutane | 17.3 | 82.7 | 11 | . . . | 158 | —255 | 19,500 | 91,000 | 0.558 | 4.65 |
| Paraffin | Normal pentane | 16.8 | 83.2 | 97 | 16 | 154 | —201 | 19,300 | 101,000 | 0.627 | 5.23 |
| Paraffin | Isopentane or 2-methylbutane | 16.8 | 83.2 | 82 | 22 | 146 | —256 | 19,300 | 100,000 | 0.621 | 5.17 |
| Paraffin | Neohexane or 2,2-dimethylbutane | 16.4 | 83.6 | 122 | 10 | 131 | —148 | 19,200 | 104,000 | 0.650 | 5.42 |
| Paraffin | 2,3-Dimethylbutane | 16.4 | 83.6 | 136 | 8 | 136 | —199 | 19,200 | 106,000 | 0.663 | 5.52 |
| Paraffin | Normal heptane | 16.1 | 83.9 | 209 | 1.7 | 136 | —131 | 19,200 | 110,000 | 0.685 | 5.71 |
| Paraffin | 2,4-Dimethylpentane | 16.1 | 83.9 | 177 | 3.5 | 127 | —183 | 19,100 | 107,000 | 0.674 | 5.61 |
| Paraffin | Triptane or 2,2,3-trimethylbutane | 16.1 | 83.9 | 178 | 3.5 | 124 | — 13 | 19,100 | 110,000 | 0.691 | 5.76 |
| Paraffin | Isooctane (octane) or 2,2,4-trimethylpentane | 15.9 | 84.1 | 211 | 1.8 | 117 | —161 | 19,100 | 110,000 | 0.693 | 5.77 |
| Paraffin | 2,2,3-Trimethylpentane | 15.9 | 84.1 | 230 | 1.2 | 121 | —170 | 19,100 | 114,000 | 0.717 | 5.98 |
| Paraffin | 2,3,3-Trimethylpentane | 15.9 | 84.1 | 239 | 0.9 | 123 | —149 | 19,100 | 116,000 | 0.727 | 6.06 |
| Paraffin | 2,3,4-Trimethylpentane | 15.9 | 84.1 | 236 | 1.0 | 123 | —165 | 19,100 | 115,000 | 0.720 | 6.00 |
| Paraffin | Normal decane | 15.6 | 84.4 | 345 | 0.06 | 119 | — 21 | 19,000 | 116,000 | 0.731 | 6.09 |
| Paraffin | Cetane | 15.1 | 84.9 | 547 | <0.001 | 98 | + 65 | 18,900 | 122,000 | 0.774 | 6.45 |
| Cyclic paraffin | Cyclopentane | 14.4 | 85.6 | 121 | 10.5 | 167 | —137 | 18,800 | 117,000 | 0.746 | 6.22 |
| Cyclic paraffin | Methylcyclopentane | 14.4 | 85.6 | 161 | 4.8 | 148 | —224 | 18,800 | 118,000 | 0.750 | 6.25 |
| Cyclic paraffin | Cyclohexane | 14.4 | 85.6 | 177 | 3.3 | 154 | + 44 | 18,700 | 122,000 | 0.780 | 6.50 |
| Cyclic paraffin or naphthene | Decalin | 13.1 | 86.9 | 374 | 0.04 | 135 | — 40 | 20,000 | 140,000 | 0.88 | 7.4 |
| Cyclic paraffin or naphthene | 2-Cyclohexyl-octane | 14.4 | 85.6 | 504 | <0.001 | 135 | <— 70 | . . . | . . . | 0.825 | 6.88 |
| Aromatic | Benzene | 7.7 | 92.3 | 176 | 3.2 | 169 | + 42 | 17,300 | 127,000 | 0.881 | 7.34 |
| Aromatic | Toluene | 8.8 | 91.2 | 231 | 1.2 | 156 | —139 | 17,400 | 126,000 | 0.869 | 7.23 |
| Aromatic | Ortho-xylene or 1,2-dimethylbenzene | 9.5 | 90.5 | 292 | 0.3 | 149 | — 13 | 17,500 | 129,000 | 0.882 | 7.35 |
| Aromatic | Meta-xylene or 1,3-dimethylbenzene | 9.5 | 90.5 | 282 | 0.35 | 147 | — 54 | 17,500 | 126,000 | 0.866 | 7.21 |
| Aromatic | Para-xylene or 1,4-dimethylbenzene | 9.5 | 90.5 | 281 | 0.35 | 146 | + 56 | 17,500 | 126,000 | 0.863 | 7.19 |
| Aromatic | Ethylbenzene | 9.5 | 90.5 | 277 | 0.4 | 146 | —139 | 17,600 | 127,000 | 0.869 | 7.24 |
| Aromatic | Cumene or isopropylbenzene | 10.1 | 89.9 | 306 | 0.2 | 134 | —141 | 17,700 | 127,000 | 0.864 | 7.19 |
| Aromatic | Normal propyl benzene | 10.1 | 89.9 | 319 | 0.15 | 137 | —147 | 17,700 | 127,000 | 0.864 | 7.19 |
| Aromatic | Naphthalene (moth balls) | 6.3 | 93.7 | 424 | Solid | . . . | +176 | 16,700 | . . . | Solid | Solid |
| Aromatic | Alpha-methyl-naphthalene | 7.1 | 92.9 | 473 | 0.003 | 140 | — 23 | 16,700 | 140,000 | 1.022 | 8.51 |
| Aromatic | 2-Phenyl-octane | 11.6 | 88.4 | 464 | 0.001 | 139 | — 38 | 18,200 | 130,000 | 0.859 | 7.15 |
| Aromatic amine | Aniline | 7.6 | 77.4 | 364 | 0.04 | 187 | + 21 | 15,000 | 128,000 | 1.024 | 8.53 |
| Aromatic amine | Monomethyl aniline or n-methylaniline | 8.5 | 78.5 | 384 | 0.02 | 172 | — 71 | 15,600 | 128,000 | 0.988 | 8.23 |
| Aromatic amine | 2,4-Xylidine | 9.2 | 79.3 | 420 | 0.005 | 150 | . . . | 15,600 | 127,000 | 0.976 | 8.13 |
| Aromatic amine | 2,6-Xylidine | 9.2 | 79.3 | 422 | 0.005 | 150 | . . . | 15,600 | 127,000 | 0.981 | 8.17 |
| Metal-organic | Tetraethyllead | 6.2 | 29.7 | 388 | 0.02 | 60 | —202 | 7,800 | 108,000 | 1.656 | 13.8 |
| Organic halide | Ethylene dibromide (1,2-dibromoethane) | 2.1 | 12.8 | 269 | 0.5 | 83 | + 50 | . . . | . . . | 2.185 | 18.2 |
| Alcohol | Ethanol (grain alcohol) | 13.1 | 52.1 | 173 | 2.3 | 370 | —174 | 11,500 | 76,000 | 0.790 | 6.58 |
| Alcohol | Isopropanol (isopropyl alcohol) | 13.4 | 60.0 | 180 | 1.8 | 290 | —129 | 13,100 | 86,000 | 0.786 | 6.55 |
| Aromatic-olefin | Styrene | 7.7 | 92.3 | 293 | 0.3 | 152 | — 23 | 17,400 | 132,000 | 0.908 | 7.56 |
| Olefin | Ethylene | 14.4 | 85.6 | —155 | . . . | 208 | —272 | 20,300 | . . . | Gas | Gas |
| Olefin | Butylene-1, 1-butene | 14.4 | 85.6 | + 21 | 62 | 168 | —302 | 19,500 | 97,000 | 0.596 | 4.97 |
| Olefin | Butylene-2, Cis-2-butene | 14.4 | 85.6 | + 39 | 46 | 179 | —218 | 19,400 | 101,000 | 0.622 | 5.19 |
| Olefin | 1-Pentene | 14.4 | 85.6 | + 86 | 19 | 154 | —265 | 19,300 | 104,000 | 0.642 | 5.35 |
| Olefin | 1-Heptene | 14.4 | 85.6 | 201 | 2.0 | 148 | —182 | 19,200 | 112,000 | 0.698 | 5.82 |
| Olefin | 1-Decene | 14.4 | 85.6 | 339 | 0.09 | 131 | — 98 | 19,100 | 118,000 | 0.742 | 6.18 |
| Olefin | 1-Dodecene | 14.4 | 85.6 | 416 | 0.015 | 123 | — 32 | 19,100 | 121,000 | 0.759 | 6.33 |
| Olefin | Cetene or 1-hexadecene | 14.4 | 85.6 | 545 | <0.001 | 112 | + 39 | 19,000 | 124,000 | 0.783 | 6.52 |
| Olefin | Iso-butylene or 2-methylpropene | 14.4 | 85.6 | 20 | 65 | 169 | —221 | 19,400 | 96,000 | 0.595 | 4.96 |
| Olefin | 2,3,3-Trimethyl-1-butene (triptene) | 14.4 | 85.6 | 172 | 3.6 | 124 | —169 | 19,100 | 112,000 | 0.706 | 5.88 |
| Olefin | Diisobutylene or 2,4,4-trimethyl-1-pentene | 14.4 | 85.6 | 215 | 1.6 | . . . | —136 | 19,000 | 113,000 | 0.716 | 5.97 |
| Olefin | Diisobutylene or 2,4,4-trimethyl-2-pentene | 14.4 | 85.6 | 221 | 1.4 | . . . | —160 | 19,000 | 114,000 | 0.722 | 6.02 |
| Diolefin | 1,3-Butadiene | 11.2 | 88.8 | 24 | 59 | 178 | —164 | 19,000 | 98,000 | 0.622 | 5.18 |
| Acetylene | Acetylene | 7.7 | 92.3 | —119 | . . . | . . . | —114 | 20,700 | . . . | Gas | Gas |
| Acetylene | 1-Butyne | 11.2 | 88.8 | + 48 | 38 | 186 | —194 | 19,600 | 106,000 | 0.65 | 5.4 |
| Organic nitrate | Amyl nitrate | 9.5 | 51.3 | 305 | 0.18 | 121 | —139 | . . . | . . . | 0.999 | 8.32 |
| Organic sulfur compound | Butyl mercaptan | 11.2 | 53.3 | 208 | 0.9 | 151 | —177 | 15,000 | 105,000 | 0.836 | 6.97 |
| | Sulfur | | | 832 | . . . | . . . | +235 | 3,980 | . . . | Solid | Solid |
| | Hydrogen sulfide | 5.9 | | — 77 | . . . | . . . | —122 | 6,500 | . . . | Gas | Gas |

# Where PETROCHEMICALS Come From . . .

## *Here's a list of some of the many obtainable by direct extraction from petroleum*

**TABLE 1—VOLUME PER CENT OF PARAFFINS, NAPHTHENES, AND AROMATICS IN STRAIGHTRUN FRACTIONS BOILING IN RANGE, 97°-320° F.**

| Sample and source—State and field— | Fraction in total crude or cond. | Per cent | | |
|---|---|---|---|---|
| | | Paraffins | Naphthenes | Aromatics |
| California: | | | | |
| Coalinga, Eastside (Eocene) | 12.97 | 29.1 | 57.5 | 13.4 |
| Louisiana: | | | | |
| Golden Meadow B | 7.72 | 41.7 | 50.0 | 8.3 |
| Jennings (Evangeline) | 11.89 | 40.5 | 39.2 | 20.3 |
| New Mexico: | | | | |
| Monument | 19.06 | 42.1 | 53.8 | 4.1 |
| Texas: | | | | |
| Carthage (Upper Pettit) | 55.81 | 72.8 | 19.2 | 8.0 |
| Chapel Hill (condensate) | 66.71 | 79.4 | 16.9 | 3.7 |
| Conroe | 15.52 | 31.2 | 47.6 | 21.2 |
| East Texas | 16.12 | 42.6 | 50.3 | 7.1 |
| Hastings | 6.98 | 25.2 | 72.7 | 2.1 |
| Hull-Silk-Sikes | 26.30 | 49.0 | 46.9 | 4.1 |
| KMA (Strawn) | 26.80 | 46.0 | 48.6 | 5.4 |
| Old Ocean | 23.26 | 48.7 | 39.8 | 11.5 |
| Old Ocean (condensate-Chenault) | 32.90 | 45.6 | 42.9 | 11.5 |
| Old Ocean (condensate-Larsen) | 53.00 | 46.7 | 35.6 | 17.7 |
| Plymouth | 20.00 | 29.6 | 65.6 | 4.8 |
| Saxet | 3.61 | 16.3 | 81.5 | 2.2 |
| Segno | 17.97 | 37.4 | 45.2 | 17.4 |
| Slaughter | 21.40 | 40.6 | 36.0 | 23.4 |
| Tom O'Connor | 20.43 | 36.1 | 56.0 | 7.9 |
| Wade City | 16.76 | 13.5 | 77.9 | 8.6 |
| Wasson | 23.60 | 43.3 | 36.9 | 19.8 |
| Yates, Taylor Link | 13.25 | 49.1 | 49.9 | 1.0 |
| Wyoming: | | | | |
| Elk Basin | 15.10 | 62.0 | 27.6 | 10.4 |

IN response to the increased demand for information on petrochemicals by many people in all phases of the petroleum industry, The Oil and Gas Journal engineering staff has compiled data on a number of these compounds.

The table of physical properties was compiled from "Aviation Fuels and Their Effects on Engine Performance," published by Ethyl Corp.

Table 1 shows the volume per cent of paraffins, naphthenes, and aromatics in straightrun fractions boiling in range, 97° to 320° F. These fractions were recovered from various crudes and condensates in which compounds desired for petrochemical use occur in appreciable amounts.

Table 2 shows the volume per cent of individual hydrocarbons in straightrun base stocks from these same sources, in the same boiling range. Table 3 shows the volume per cent of seven-carbon-atom naphthenes and toluenes in crude oil, condensate, and natural-gasoline samples.

Tables 1, 2, and 3 were compiled from information presented in Bulletin 497 of the U. S. Bureau of Mines.

Table 4 shows the petrochemicals in Mid-Continent naphthas. This table is taken from the article, "Composition of Virgin, Thermal, and Catalytic Naphthas From Mid-Continent Petroleum," by W. C. Cady, R. F. Marschner, and W. P. Cropper, Standard Oil Co. of Indiana, published in Industrial and Engineering Chemistry, Vol. 44, No. 8, August 1952.

**TABLE 2—VOLUME PER CENT OF INDIVIDUAL HYDROCARBONS IN STRAIGHTRUN BASE STOCKS IN THE 97°-243° F. BOILING RANGE**

| Crude oil source, state and field— | Cyclo-pentane | Methyl-cyclo-pen-tane | Benzene | Cyclo-hexane | 1,1-Di-methyl-cyclo-pentane | Trans-1,3-di-methyl-cyclo-pentane | Trans-1,2-di-methyl-cyclo-pentane | Methyl-cyclo-hexane | Ethyl-cyclo-pen-tane | Toluene | Tri-methyl-cyclo-pen-tanes | Alkyl cyclo-pen-tanes | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| California: | | | | | | | | | | | | | |
| Coalinga, Eastside (Eocene) | 0.13 | 0.76 | 0.17 | 0.56 | 0.09 | 0.36 | 5.52 | 1.07 | 0.32 | 0.60 | 0.53 | 0.07 | 7.39 |
| Louisiana: | | | | | | | | | | | | | |
| Golden Meadow B | .04 | .23 | .05 | .27 | .03 | .20 | .14 | .63 | .15 | .17 | .20 | .06 | 4.09 |
| Jennings (Evangeline) | .04 | .29 | .21 | .41 | .06 | .15 | .05 | 1.05 | .14 | .72 | .22 | .03 | 5.82 |
| Texas: | | | | | | | | | | | | | |
| Carthage (Upper Pettit)* | .10 | .73 | 2.08 | 1.18 | .07 | .36 | .27 | 1.97 | .42 | .87 | .48 | None | 29.30 |
| Chapel Hill* | .10 | .77 | .38 | .61 | .08 | .22 | .13 | 1.48 | .29 | .37 | .28 | .05 | 24.18 |
| Conroe | .10 | .71 | .36 | 1.13 | .04 | .28 | .17 | 2.40 | .22 | 1.78 | .39 | .01 | 10.89 |
| East Texas | .12 | .75 | .07 | .49 | .04 | .53 | .51 | 1.17 | .28 | .30 | .39 | .13 | 8.87 |
| Hastings | .05 | .31 | .01 | .56 | .03 | .24 | .10 | 1.33 | .15 | .03 | .13 | .04 | 4.12 |
| Hulk-Silk-Sikes | .17 | .87 | .06 | .47 | .12 | .66 | 1.20 | 1.21 | .57 | .29 | .70 | .19 | 13.94 |
| KMA (Strawn) | .18 | 1.09 | .09 | .68 | .06 | 1.03 | .77 | 1.79 | .53 | .37 | .66 | .16 | 14.52 |
| Old Ocean | .10 | .65 | .27 | .88 | .10 | .47 | .17 | 2.07 | .42 | .72 | .41 | .05 | 12.03 |
| Plymouth | .10 | .62 | .05 | 1.35 | .07 | .48 | .34 | 2.77 | .42 | .25 | .37 | .14 | 10.60 |
| Saxet | .01 | .11 | None | .22 | .02 | .07 | .05 | .59 | .06 | None | .07 | .04 | 1.58 |
| Segno | .10 | .63 | .18 | .95 | .05 | .30 | .12 | 2.14 | .27 | .98 | .25 | .03 | 9.90 |
| Tom O'Connor | .11 | .72 | .06 | 1.18 | .07 | .47 | .28 | 2.48 | .35 | .36 | .39 | .13 | 10.76 |
| Wade City | .10 | .56 | .03 | 1.13 | .07 | .30 | .30 | 2.69 | .39 | .23 | .28 | .12 | 7.56 |
| Wasson | .14 | .76 | .80 | .89 | .07 | .44 | .36 | 1.16 | .32 | 1.52 | .52 | .05 | 13.22 |
| Yates, Taylor Link | .05 | .24 | None | .27 | .07 | .56 | .13 | .59 | .06 | None | .48 | .20 | 6.24 |
| Wyoming: | | | | | | | | | | | | | |
| Elk Basin | .09 | .36 | .08 | .27 | .07 | .31 | .23 | .68 | .25 | .49 | .25 | .01 | 9.84 |

*Condensate.

**TABLE 3**

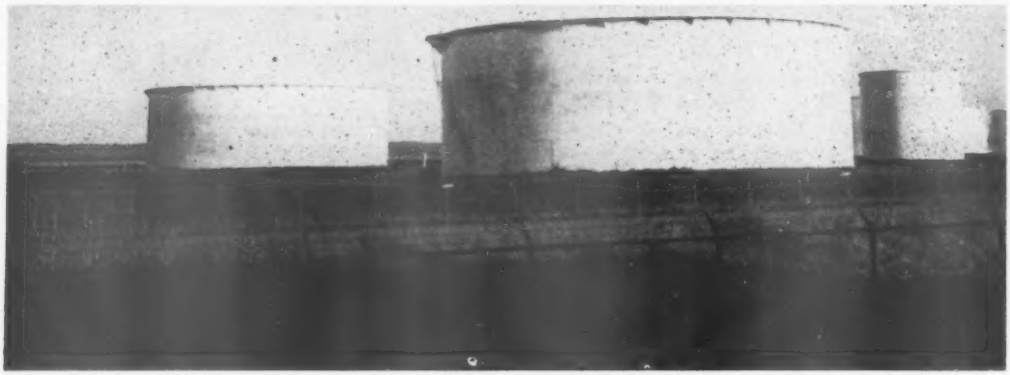
**Volume Per Cent of Seven-Carbon Atom Naphthenes and Toluene in Oil Samples**

| Sample, source, state and field— | C7-naphthenes | Toluene |
|---|---|---|
| ARKANSAS: | | |
| Big Creek* | 12.37 | 2.52 |
| Dorcheat*† | 12.16 | 2.35 |
| Macedonia (Cotton Valley horizon)* | 10.22 | .82 |
| Macedonia*† | 10.23 | 2.17 |
| McKamie* | 8.58 | 1.80 |
| Texarkana* | 12.18 | 1.49 |
| CALIFORNIA: | | |
| Coalinga, East (Eocene) | 2.36 | .59 |
| Coles Levee (Southeast area) | 4.05 | .87 |
| Coyote, East | 3.11 | .26 |
| Elk Hills (Tupman area) | .95 | .02 |
| Helm (7,300-ft. sand) | 12.69 | 1.07 |
| Inglewood (all zones) | 1.99 | .28 |
| ILLINOIS: | | |
| Benton | 2.78 | .41 |
| Centralia (Chester) | 2.67 | .11 |
| Louden (Chester) | 2.77 | .19 |
| New Harmony‡ | 6.10 | .30 |
| Salem | 2.86 | .47 |
| Woodlawn | 1.74 | .28 |
| KANSAS: | | |
| Bemis | 2.05 | Trace |
| Burnett | 2.21 | .00 |
| Silica | 3.24 | .03 |
| Western Kansas pipe line | 1.98 | .04 |
| LOUISIANA: | | |
| Cotton Valley* | 3.29 | 1.93 |
| Elton, South* | 10.99 | 1.78 |
| Golden Meadow B | 1.17 | .18 |
| Jennings (Evangeline) | 1.47 | .70 |
| Mermantau, West* | 10.75 | 2.48 |
| Ville Platte | 3.82 | .59 |
| Woodlawn* | 7.25 | 2.98 |
| MONTANA: | | |
| Cut Bank | 1.45 | |
| NEW MEXICO: | | |
| Lea County common stream | 3.07 | .90 |
| Monument | 2.31 | .14 |
| OKLAHOMA: | | |
| Burbank | 1.61 | .09 |
| Cement | 1.51 | .29 |
| Oklahoma City | 1.55 | .38 |
| TEXAS: | | |
| Agua Dulce* | 12.18 | 1.38 |
| Alice* | 12.15 | .76 |
| Carthage* | 3.06 | .87 |
| Conroe | 3.11 | 1.76 |
| Cowden, North | 2.51 | 1.04 |
| East Texas | 2.53 | .27 |
| Goldsmith | 2.49 | .52 |
| Hastings | 1.85 | .04 |
| Hawkins | .61 | .18 |
| Howard-Glasscock | 2.20 | .26 |
| Hull-Slick (Strawn) | 3.86 | .29 |
| Hull-Slick (Caddo) | 2.05 | .22 |
| KMA (Strawn) | 3.82 | .43 |
| KMA (Ellenburger) | 4.04 | .34 |
| La Gloria* | 10.26 | .96 |
| Old Ocean | 5.56 | 1.22 |
| Old Ocean* | 9.65 | 1.84 |
| Rincon | 5.40 | .84 |
| Saxet | .81 | Trace |
| Slaughter | 1.97 | 1.46 |
| Wasson | 2.52 | 1.17 |
| WEST VIRGINIA: | | |
| Natural gasoline | 6.38 | .93 |
| WYOMING: | | |
| Lance Creek | 2.18 | .27 |
| Salt Creek | .94 | .08 |

*Condensate. †Lime. ‡Natural gasoline.

**TABLE 4—HYDROCARBONS IN MID-CONTINENT NAPHTHAS**

| Carbon No. | Hydrocarbon | Boiling point (°C.) | Per cent present in naphthas: Virgin | Thermal | Catalytic |
|---|---|---|---|---|---|
| 4 | 2-Methylpropane | —11.7 | 9.7 | 0.7 | 2.7 |
| | 2-Methylpropene | —6.9 | | 1.1 | 1.7 |
| | 1-Butene | —6.3 | | 1.5 | 4.9 |
| | n-Butane | —0.5 | 91.3 | 66.6 | 27.0 |
| | trans-2-Butene | 0.9 | | 30.1 | 27.1 |
| | cis-2-Butene | 3.7 | | | 36.6 |
| | | | 100.0 | 100.0 | 100.0 |
| 5 | 2,2-Dimethylpropane | 9.5 | | 0.1 | |
| | 3-Methyl-1-butene | 20.2 | | 2.4 | 0.6 |
| | 2-Methylbutane | 27.8 | 42.1 | 20.4 | 51.8 |
| | 1-Pentene | 30.1 | | 12.6 | 2.1 |
| | 2-Methyl-1-butene | 31.1 | | 8.2 | 7.6 |
| | trans-2-Pentene | 36.0 | | 9.5 | 9.2 |
| | n-Pentane | 36.1 | 53.0 | 35.2 | 8.7 |
| | 2-Methyl-2-butene | 38.5 | | 6.8 | 17.3 |
| | Cyclopentene | (44.0) | | 2.4 | 1.8 |
| | Cyclopentane | 49.3 | 4.9 | 2.4 | 0.9 |
| | | | 100.0 | 100.0 | 100.0 |
| 6 | 2,2-Dimethylbutane | 49.7 | 0.5 | 0.3 | 0.2 |
| | 3 and 4-Methyl-1-pentene | 54.0 | | 5.4 | 1.5 |
| | 2,3-Dimethyl-1-butene | 55.6 | | | 1.5 |
| | 2,3-Dimethylbutane | 58.0 | 0.5 | 1.1 | 9.0 |
| | cis-4-Methyl-2-pentene | 58.4 | | 3.8 | 2.6 |
| | 2-Methylpentane | 60.3 | 17.6 | 10.7 | 29.1 |
| | 2-Methyl-1-pentene | 62.2 | | 3.8 | 5.0 |
| | 3-Methylpentane | 63.3 | 10.5 | 7.7 | 18.5 |
| | 1-Hexene | 63.6 | | 8.8 | 0.4 |
| | 3-Methyl-1-cyclopentene | (64.9) | | 1.9 | 1.9 |
| | 2-Ethyl-1-butene | 65.0 | | 0.4 | 2.8 |
| | 2-Methyl-2-pentene | 67.2 | | 3.8 | 5.6 |
| | trans-3-Methyl-2-pentene | 67.8 | | 2.3 | 2.7 |
| | cis and trans-2 and 3-Hexene | 67.6-68.6 | | 6.9 | 4.9 |
| | n-Hexane | 68.7 | 38.7 | 23.0 | 5.2 |
| | cis-3-Methyl-2-pentene | 70.5 | | 0.8 | 1.4 |
| | Methylcyclopentane | 71.8 | 18.6 | 7.3 | 3.7 |
| | 2,3-Dimethyl-2-butene | 73.2 | | 0.3 | 0.4 |
| | 1 and 4-Methyl-1-cyclopentene | (75.8-76.0) | | 5.8 | 1.5 |
| | Benzene | 80.1 | 1.0 | 1.3 | 0.9 |
| | Conjugated diolefins | | | 0.1 | 0.1 |
| | Nonconjugated diolefins | | | | 0.1 |
| | Cyclohexane | 80.7 | 12.6 | 3.4 | 0.7 |
| | Cyclohexene | (83.2) | | 1.1 | 0.3 |
| | | | 100.0 | 100.0 | 100.0 |
| 7 | Olefins | 76-78 | | | 0.7 |
| | 2,2-Dimethylpentane | 79.2 | 1.1 | | 1.9 |
| | 2,4-Dimethylpentane | 80.5 | 0.4 | | |
| | Olefins | 81-86 | | | 4.0 |
| | 3,3-Dimethylpentane | 86.6 | | | 0.7 |
| | 1,1Dimethylcyclopentane | 87.5 | 0.8 | | 0.2 |
| | Olefins | 87-89 | | | 2.7 |
| | 2,3-Dimethylpentane | 87.8 | 0.8 | | 16.9 |
| | 2-Methylhexane | 90.1 | 10.1 | | 6.5 |
| | trans-1,3-Dimethylcyclopentane | 90.8 | 4.1 | | 0.7 |
| | Olefins | 91.0 | | | 3.5 |
| | trans-1,2-Dimethylcyclopentane | 91.9 | 13.1 | | 7.9 |
| | 3-Methylhexane | 92.0 | 13.9 | | 11.5 |
| | Conjugated diolefins | | | | 0.4 |
| | Nonconjugated diolefins | | | | 0.2 |
| | Olefins | 93-99 | | | 17.5 |
| | n-Heptane | 98.4 | 26.2 | | 4.4 |
| | cis-1,2-Dimethylcyclopentane | 99.3 | | | 1.8 |
| | Methylcyclohexane | 100.9 | 22.1 | | 7.1 |
| | 3 and 4-Methyl-1-cyclohexene | (102-103) | | | 2.4 |
| | Ethylcyclopentane | 103.5 | 3.7 | | 1.4 |
| | 1-Methyl-1-cyclohexene | (109.5) | | | 0.7 |
| | Toluene | 110.6 | 3.7 | | 6.9 |
| | | | 100.0 | | 100.0 |
| 8 | Paraffins | | 56.6 | | 41.8 |
| | Olefins and cycloolefins | | | | 33.7 |
| | 1,1,3-Trimethylcyclopentane | (105) | 6.8 | | 4.2 |
| | Trimethylcyclopentanes | | | | 2.1 |
| | Trimethylcyclopentenes | | | | 6.5 |
| | Dimethylcyclohexanes | | 14.9 | | 7.0 |
| | trans-1,2-Dimethylcyclohexane | 123.4 | 5.1 | | |
| | Ethylcyclohexane | 131.8 | 9.8 | | |
| | Aromatics | | 6.8 | | 4.7 |
| | | | 100.0 | | 100.0 |
| 9 | Paraffins | | 52.1 | | 67.0 |
| | Olefins and cycloolefins | | | | 16.3 |
| | Cycloparaffins | | 41.0 | | 9.7 |
| | Aromatics | | 6.9 | | 7.0 |
| | | | 100.0 | | 100.0 |



**1** You don't have to get close to an oil-field storage tank to spot rust on the shell, for it is visible as far as the tank itself. At 200 yd. the paint failure is so obvious that closer inspection seems hardly necessary. However, all final inspections should be made at close range. Tanks above had been repainted 2½ years previously. One might believe that inspection prior to the last paint application resulted in the wrong recommendations, or that lack of adequate inspection during application resulted in an inferior job.

## "Beauty" is only skin deep, but . . .

# Proper Painting of Tanks Assures Long Life

SUCCESS in maintaining storage tanks in the petroleum and petrochemicals industries is dependent upon the proper selection, proper application, and proper care of the painted surface.

However, any paint manufacturer will tell you that, above all, priming of the surface before the paint is actually applied is the foundation of the entire job—the success of the paint job depends entirely on the success of the priming job.

**What should be done . . .** Suppose you are delegated to paint an oil-field-storage tank. What are the proper steps to take? Here are some pointers, taken from Pittsburgh Plate Glass Co.'s "Pittsburgh Paints for the Petroleum Industry," an illustrated manual to help guide maintenance department in proper care of tanks:

1. Since the priming is the foundation of the entire job, inspection of the surface prior to application, during application, and after the application, must be thorough, and any shortcomings corrected.

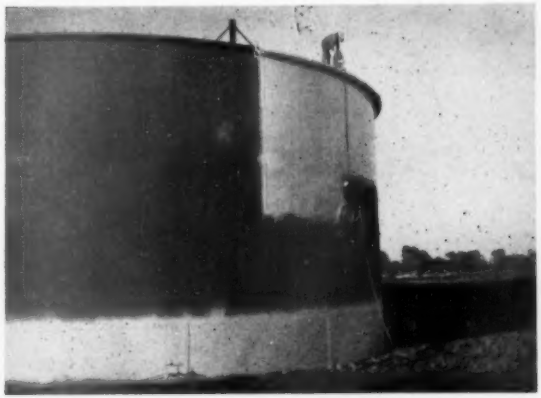
2. On spot removals, all rusting and marred spots must be thoroughly cleaned and primed before going ahead with the job.

3. On entire sandblasted jobs, all rust, scale, and old paint must be removed and the primer promptly applied.

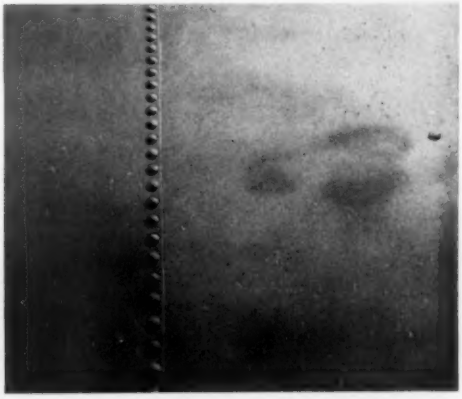
4. Spraying equipment must be in

**2** Preliminary cleaning of a floating roof. Loose rust, sand from the sandblasting of the shell, and water are being removed. Many times a pneumatic rotary wire brush must be used on tank roofs, because sandblasting might cause a fire or explosion of ever-present vapors. But even this leaves much to be desired in adequately cleaning tank roofs. Sometimes chemical cleaners must be used.

**3** A typical sandblasting operation. Part of the tank is covered with paint to be removed, part of the tank has been sandblasted, and part of the tank's shell has already been primed. Sandblasted surfaces must be primed within 1 hour, and should never be allowed to stand overnight, because rust will form quickly and the entire procedure will have to be done all over again.



**4** Two coats of finish will be applied here, with the first coat in the process. Note that the hiding is almost adequate in one coat, but a second coat is needed because it gives adequate film thickness to help stand the rigors of weather. Application is being made from a chair. While it is a satisfactory method of scaffolding, many operators use a swing stage supporting two men because the tendency is to do a better job from a swing stage.



**5** A particularly insidious type of defect is shown here. The spray hand had applied paint in what appeared to be a normal and acceptable manner, but it happened that through an oversight a small area was covered only by what is known as "overspray"—that part of the atomized paint carried to one side of where the spray gun was directed. Coating is not dense enough to stand up.

good condition, meaning that the paint in your pot must be free from skins and of the right consistency. Thinners, when needed, must be measured and added slowly. If paint coming through the spray gun sputters, or produces a split stream, additional cleaning of the paint or repairs to the gun may be needed. Spray guns used constantly sometimes need new parts. If paint sags, it may be reduced excessively or wrong thinners may have been used. Or your technique in spraying might be faulty.

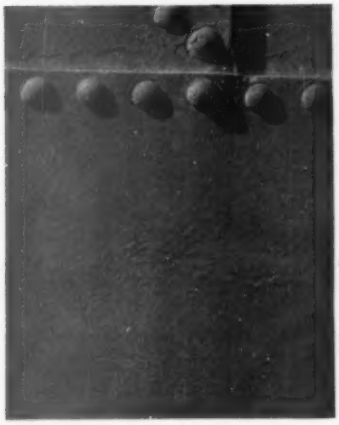
5. Your paint inspector must watch carefully for flaws in application. He may notice skips. These can readily be corrected, of course. And paint may be applied too thinly, but this can be watched by keeping account of the amount of paint used and the area sprayed.

6. Amount of paint used in an area sprayed should be recorded. If the spread varies greatly from the figures, 25 to 30 sq. yd. per gallon, the amount of paint is not correct.

**Examples of flaws . . .** In one painting operation, the inspector noted that the wind girder had been coated so thinly on the edges that the steel was showing through. He observed this defect promptly so that correction was made simply by applying additional primer. The necessity for special care in spraying irregularly shaped objects where complete coverage is achieved with difficulty cannot be overemphasized. In such cases where the inspector's eyesight is not unusually keen, a low-powered sports binocular could be helpful in observing the defects.

On floating-roof tanks, water, snow, and ice may lie on the paint for months. Continued contact with water, in addition to an unceasing flexing of the metal and paint as the roof is lifted and dropped, raise havoc with paint. Under these conditions, all rust, loose paint, and moisture must be eliminated before refinishing.

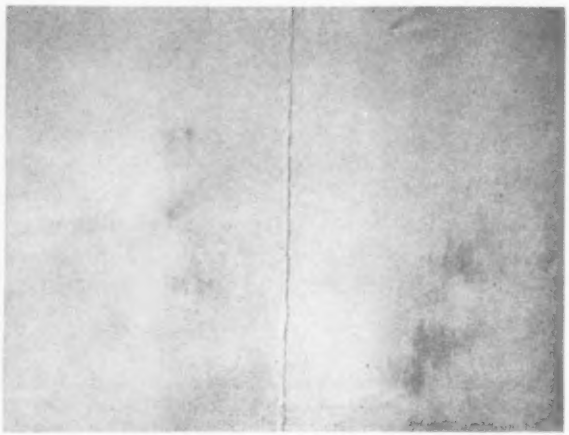
It would be preferable to sandblast, but there are in this case, unfortunately, several interfering factors. Because there is likely to be a certain amount of vapor present, sandblasting might cause enough sparks to start a fire or explosion. In addition, the sand tends to deposit in the seals or in the moving parts. Therefore, ordinarily only wire brushing and scraping are per-



**6** Here is a repaint job where only the lower ring was sandblasted, primed, and finished. Above the rivet line is a rough line representing the terminus of the sandblasting. It does not represent a defect but may aid you in interpreting such surface irregularities. Entire area below rivet line is wrinkled and sags show. Cause: Paint too thick.

**7** This failure was encountered because of "alligatoring." It sometimes occurs because of materials applied prior to application of new paint. This job was put over a soft asphalt finish, and due to alternate softening and travel of the asphalt, paint over it failed. This type of material should be removed by sandblasting, and on a cold day.

**8** Lower ring failures as conspicuous as this may be encountered with upper areas still in good condition. In these cases, sandblasting of bottom ring only is recommended. Reason for failure: Snow, ice, and undrained water may remain in contact with paint.



**9** Paint on this tank has chalked moderately and is eroding gradually. Soon primer will show through, as illustrated. Here is represented an ideal end point: Wire brushing followed by two coats of finish should recondition the surface for more years of surface. Small scars and rust spots must be reconditioned by brushing and scraping.

missible, except in exceptional cases.

**Cleaning roofs . . .** In preliminary cleaning of a floating roof, loose rust, sand from the sandblasting of the shell, and water must be removed.

In one case, after a roof was given a preliminary cleaning, part of the surface was scraped and wire brushed. Cleaning in this fashion was naturally inadequate. A pneumatic rotary wire brush was obtained, which did a much better job. However, sparks were very much in evidence. Bronze-wire brushes are available, though, which are designed to eliminate sparking because the bristles tend to break off and fly through the air with considerable force.

This cleaning method is much superior to hand cleaning, but it leaves a lot still to be desired. Use of a chemical cleaner can be used to advantage in this type of work under certain conditions.

**Sandblasting . . .** Continuous and careful inspection is of the utmost importance where sandblasting is necessary. Equipment must be checked, and good clean, dry sand—not too coarse—must be provided.

A sand heater and drier should be used at all times. If the sand is wet, a 12-in. metal tube inclined somewhat, extending through a pile of sand, can be used as a heater, using any available fuel. The compressor must be in good condition, not throwing oil, and with proper provision for separating oil and water from the air. This separator should be checked frequently to see that oil and water are not accumulating and are properly removed.

Sandblasting should be an orderly job, done in a deliberate manner in order that all paint, rust, and removable scale are eliminated. After a considerable stretch has been sandblasted, primer must be applied before any rusting takes place.

The best practice demands application of the primer within 1 hour after blasting. However, it is not always practical to follow the sandblasting that closely. If weather is threatening or if an influx of cold petroleum causes sweating, it is advisable to stop operations, prime the dry surfaces, and resandblast the areas which become wet. Do not in any case prime over rain, snow, ice, or condensate. A good rule: **Never let a sandblasted area stand unprimed overnight!**

**Painting . . .** Two coats of finish must be applied to give proper protection. Hiding is almost adequate in one coat, but the second coat is needed to give adequate film thickness.

Naturally the finish coats should not be applied until after proper inspection of the primer, assuring that there are no defects in the film. Amounts of paint used should be controlled at the rate of 1 gal. to 25 to 30 sq. yd. Paint should be properly thinned and the type of thinner used should be supervised, as previously mentioned.

In hot weather, a relatively slow thinner should be used, but in cold weather a fast thinner should be supplied. If paint does not flow properly in hot weather, use a slower thinner, and if a paint tends to sag, use a faster reducer and perhaps a smaller amount of thinner.

Care must be taken to give a good full coat, but at the same time not one which is excessively heavy. The latter will often result in sags which are obvious soon after application. But under proper drying conditions such an application will not only sag, but will wrinkle.

**Other hazards . . .** Painting failures are sometimes encountered which are due to materials applied prior to application of the present paint system. An example of this is a new paint job over a soft asphalt finish previously applied (see No. 7). Due to the alternate softening and travel of the asphalt, the finishes applied over the asphalt fail by what is known as "alligatoring." Removal of all old paint by sandblasting is necessary in this case. It is preferable to sandblast this type of material on cool or cold days when the asphalt is harder and more brittle. Careful inspection during sandblasting is imperative.

**Easy to see . . .** Rust on shells of tanks is plainly visible, from as far away as the tanks themselves can be seen. At 200 yd. the failure is so obvious that

closer inspection hardly seems necessary, although all final inspections should be made at close range.

**Falling paint . . .** When falling paint is observed, such a general failure will probably lead to the conclusion that drastic cleaning, such as sandblasting, is necessary. However, close inspection is necessary before a final conclusion can be reached.

Occasionally some considerable amount of steel work about a tank causes mechanical rupturing of the film and local rust spots which may be corrected by local scraping and wire brushing, followed by spot priming and application of finish—provided the rest of the film is intact. Usually, however, this is not the case (see No. 10).

**10 These inspectors are looking closely at paint damage. Much can be told with the normal eye, but a hand lens and pocket knife can help greatly. Area covered by rust, amount of scale, adhesion of paint, whether or not primer is completely hidden—all are essential information.**

**Eyes not enough . . .** The normal eye has its purpose in detecting tank damage, but a simple hand lense and a pocket knife are of great assistance when inspecting for damage. The area covered by rust, the amount of scale, the adhesion of the paint, whether or not the primer is completely hidden—all are essential information. Decisions such as how to recondition surfaces are based on these observations; thus, the observations must be accurate and recorded accurately.

From the extent of the failure and the history of the tank must stem the recommendation to completely remove the paint or to spot prime and refinish.

The accompanying table shows a sample-inspection record which is handy to use.

### SAMPLE INSPECTION RECORD

**Tank No. ————.** Location————.
40,000 Bbl. Cone Roof—New—Completed 8/2/42.
Allowed to rust until June 9, 1944.
Sandblasted by John Doe, painter.
One-hour interval between sandblasting and prime.

**Primer**—(Manufacturer's name and number) ———. Applied by ———.
Applied June—reduced with ½-gal. reducer to the 5-gal. can of paint. Weather threatening—but primer believed to have been applied before rain fell. Rained all night.

Gallons of paint ———. Gallons of thinner ———. Sq. yd. ———.

**June 10, 1944.** Weather clear and dry. Temperature 65°-75° F. Primer inspected—and skips were found where rusting appeared. Contractor required to sandblast rusted areas and reprime.

**June 14**—Weather clear and dry. Temperature 75°-85° F. First coat of finish applied—hiding nearly complete—no sags or runs.

Gallons of paint ———. Gallons of thinner ———. Sq. yd. ———.

**Inspection Date: May 15, 1945.**
Tank inspected—tank in excellent condition on shell and roof. Chalking mild—cleaning not complete. Slight dirt collection on shaded areas.

**May 4, 1946:**
Tank in excellent condition on shell and roof. Chalking definite. Tank clean and white.

**May 10, 1947:**
Tank in excellent condition. Shell and roof. Chalking definite. Cleaning good—tank very white.

**May 15, 1948:**
Shell in excellent condition—except for isolated rust spots. Using knife, determined that these rust spots were due to scale (not removed during blasting), breaking away. Roof showing definite rusting in a number of areas.

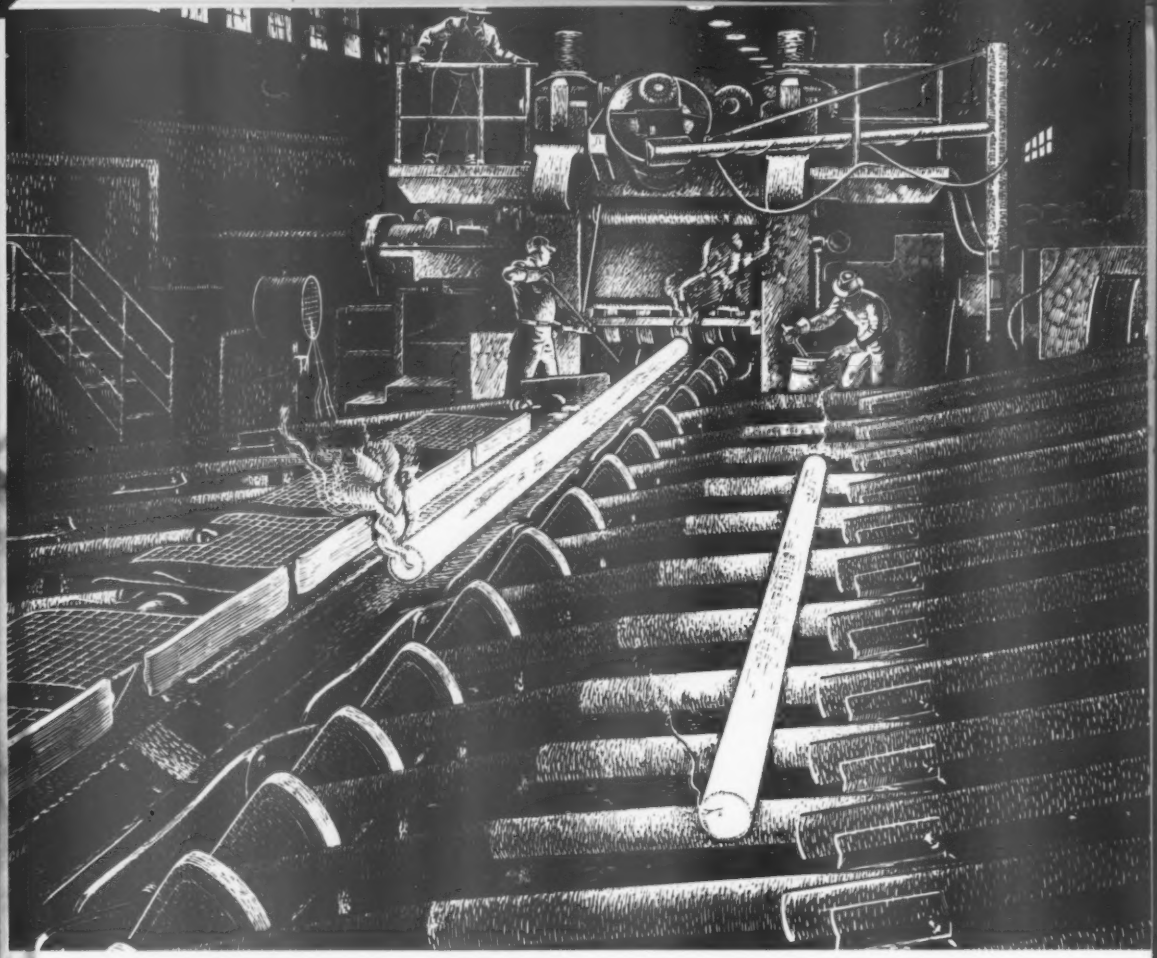
**Comments:**
Roof needs to be refinished. Recommend extensive wire brushing and scraping, repriming and two coats of finish. Shell—Expect at least 2 years' service will follow. Isolated rust areas—should be spot primed and spots finished immediately.

(Where local newspapers are available, it is advisable to include a clipping of the daily weather report while painting, noting whether or not conditions at the site of painting were at variance with the published weather report.)

### Turn Your Ideas Into Cash!

**Do you have an idea which will save time, money, or effort on your job—either in the fields or in the plants? Then why not let others know about it?**

**The Journal pays cash for all acceptable items. Address yours to: Editor, "On the Job," The Oil and Gas Journal, Box 1260, Tulsa, Okla. Photographs and manuscripts will be returned if requested.**



*Rolling Oil Country Tubular Goods* — *Scratchboard Drawing for Pittsburgh Steel Company by A. B. Sefcik*

## Progress in Steel . . . *Speeds Tubular Goods Production*

The production of oil country tubular goods is being streamlined for faster delivery to Pittsburgh Steel Company customers by a substantial addition to facilities of the tubular finishing department of the Allenport, Pennsylvania Works. This particular project, an important part of the company's Program of Progress, will consist of a new structure which will house modern precision equipment designed to speed cutting, threading, and other finishing operations. Hydrostatic testing and all other quality control operations also will be conducted in the new building from which, after final processing, the goods will be loaded for shipment.

The new tubular finishing department is typical of the many projects included in Pittsburgh Steel's $60-million Program of Progress, the major steps of which are detailed in the table below. It is a practical demonstration that the long-range program is moving steadily toward its goal of increasing output of steel products and producing them in more diversified forms in order to better serve customers. The ultimate result of this major expenditure of funds and application of engineering skills required to complete the Program of Progress will be to help strengthen our defense program on many fronts—to maintain our civilian economy as well.

### Program of Progress

| | |
|---|---|
| Acquisition of Thomas Steel Company | 100% Complete |
| Installation of new 66-inch High Lift Blooming-Slabbing Mill | 100% Complete |
| Increase of Blast Furnace Capacity by 12% Per Year | 60% Complete |
| Increase of Open-Hearth Capacity by 50% Per Year | 50% Complete |
| Installation of Continuous 66-inch Hot Rolled Sheet-Strip Mill | 70% Complete |
| Installation of 66-inch Cold Rolled Sheet-Strip Mill | 50% Complete |

# Pittsburgh Steel Company

**Pittsburgh, Pennsylvania**

THE JOURNAL'S WEEKLY
Engineering Reference
SECTION
No. 26

FANS AND BLOWERS:

# Part 7: Evaluating Friction Losses

**by M. Van Winkle***

IN order to evaluate the frictional loss in a fan or blower conduit or duct system, it is necessary to make an energy balance about the process.

**Energy balance . . .** The energy terms which are considered in this balance are energy of position, or potential energy, velocity energy, compression energy, and internal energy. Since this process does not function spontaneously, that is, there is energy input from the surroundings (in this case by the fan or blower), both mechanical energy, or work energy, and heat energy are included.

**ENERGY BALANCE (1) TO (2); 1 LB. OF GAS**

| System (gas): | (1) | (2) |
|---|---|---|
| Potential energy | $X_1$ | $X_2$ |
| Velocity energy | $v_1^2/2g$ | $v_2^2/2g$ |
| Compression energy | $P_1V_1$ | $P_2V_2$ |
| Internal energy | $U_1$ | $U_2$ |

**Between system and surroundings:**
Work energy = w
Heat energy = q

Writing the equation for complete transfer of energy between system and surroundings:

$$P_1V_1 + v_1^2/2g + X_1 + U_1 + q$$
$$= P_2V_2 + v_2^2/2g + X_2 + U_2 + w$$

Placing all system energy terms on one side and the transfer items on the other:

$$\Delta(PV) + \Delta(v^2/2g) + \Delta X + \Delta U = q - w$$

This is the thermodynamic flow equation (or Bernoulli's relation).

**Simplified equation . . .** For use with normal low pressure blower and fan applications the following assumptions are made:

1. Because of low densities of gases $\Delta X = 0$.

2. Because temperatures in the gas system are considered essentially constant and the pressures are low and, because $\Delta U$ is a function of temperature only in an ideal gas:

$$\Delta U = 0 \qquad q = 0$$

3. The work energy is the sum of the energy input to the system and the energy utilized to overcome friction:

$$w = w_s + w_f$$

The equation then becomes:

$$\Delta(PV) + \Delta(v^2/2g) = -w_s - w_f$$

Since $\rho = W/V = 1/V$ for 1 lb. of gas:

$$P_2/\rho_2 - P_1/\rho_1 + \Delta(v^2/2g) = -w_s - w_f$$

If the changes in pressure from condition (1) to condition (2) are sufficiently small so that the gas densities upstream and downstream do not vary more than 7 per cent (A.S.M.E. Code 1), $\rho_1$ can be assumed to equal $\rho_2$. Then:

$$\frac{P_2 - P_1}{\rho} + \frac{v_2^2 - v_1^2}{2g} = -w_s - w_f$$

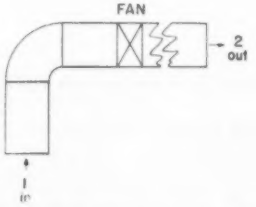



**Fig. 1—Energy balance may be written between points (1) and (2).**

where
$P_2, P_1$ = pressures, lb. per sq. ft.
$\rho$ = density, lb. per cu. ft.
$v_2, v_1$ = velocities in ft. per sec.
$g$ = gravitational constant, 32.2 ft. per sec. per sec.
$w_s$ = shaft work or work input to fan, ft.-lb. per lb. of gas
$w_f$ = frictional work (losses in process), ft.-lb. per lb. of gas

Multiplying through by $\rho$:

$$P_2 - P_1 + \rho\frac{v_2^2 - v_1^2}{2g} = -\rho w_s - \rho w_f$$

**Units . . .** In the above equation each term expresses energy in foot pounds per cubic foot of gas or:

ft.-lb./lb. × lb./cu. ft. = ft.-lb./cu. ft.
= lb./sq. ft.

To convert this pressure term from pounds per cubic foot to inches of water, the equation is divided by the conversion factor of 5.20 lb. per square foot per inch of water. When pressures are given as inches of water the term must be multiplied by 5.20 to get pounds per square foot or foot-pounds per cubic feet.

Because it is convenient to express pressures in inches of water for most fan applications the following definitions have been established:

$$p_v = \frac{pv^2}{2g\,(3{,}600)\,(5.2)}$$

$$p_f = \frac{\rho w_f}{5.2}$$

$$p_w = \frac{\rho w_s}{5.2}$$

where
$p_v, p_f$ and
$p_w$ = velocity pressure, friction pressure, and pressure increase from mechanical work respectively, in. $H_2O$
$v$ = linear velocity of gas flowing, ft./min.
$g$ = gravitational constant
$\rho$ = density of gas
$w_f$ = work to overcome friction, ft.-lb.
$w_s$ = work produced by the fan, ft.-lb.

*Professor of chemical engineering, University of Texas.

# What's NEW

In Perforating, Logging, and Fishing Tool Services

McCULLOUGH
NEW SERVICES • NEW TOOLS
NEW WAYS OF DOING THINGS

*Latest News About New Tools, Techniques and Services*

## A BONUS OF 3472 B/D

### BY USING McCULLOUGH GLASS JET PERFORATORS

THESE *TEN TOUGH WELLS → X X X X X / X X X X X → HAD A TOTAL PRODUCTION OF 602 BARRELS PER DAY

THESE SAME *TEN TOUGH WELLS WERE REPERFORATED WITH McCULLOUGH GLASS JET PERFORATORS → X X X X X / X X X X X → PRODUCTION JUMPED TO 4074 BARRELS PER DAY — A TOTAL INCREASE OF 3472 B/D — AN AVERAGE PER WELL OF 347.2 B/D.

*This is a matter of record. All ten wells had been previously perforated with little or no results. Then, they were reperforated by McCullough Glass Jet Perforators—production doubled, tripled, even quadrupled. Other operators have gained a production bonus—so can you!

The purpose of McCullough Glass Jet Perforators is to get more oil from your well. And they do... more oil through clean, full gauge, slug-free holes, deep into the formation. You get the power of the jet, plus the efficiency of the glass contained charge—harnessed to gain the kind of results you want—extra production—more oil.

So, call McCullough TODAY for the hardest shooting perforators in the world. Write for Bulletin #301.

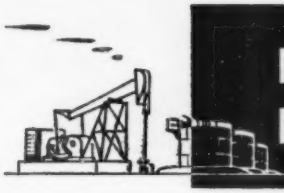
PERFORATING, RADIATION LOGGING, AND FISHING TOOL SERVICE — ANYWHERE — ANYTIME!

**McCULLOUGH TOOL COMPANY**

5820 South Alameda Street, Los Angeles 58, California
405 McCarty Street (P. O. Box 2575) • Houston, Texas

**EXPORT OFFICE:** Los Angeles, California
**CANADA:** Edmonton, Calgary, Grande Prairie, Alb.; Regina, Sask.
**VENEZUELA:** United Oilwell Service Co., S.A.; Caracas, Anaco, Maracaibo

SERVICE LOCATIONS: **TEXAS:** Houston, Snyder, Alice, Cisco, Corpus Christi, McAllen, Odessa, Tyler, San Angelo, Victoria, Wichita Falls, Luling, Beaumont, Sherman, Hadacol, El Campo. **OKLAHOMA:** Oklahoma City, Guymon, Healdton. **MISSISSIPPI:** Laurel. **NEW MEXICO:** Hobbs. **KANSAS:** Great Bend. **WYOMING:** Casper. **CALIFORNIA:** Los Angeles, Avenal, Bakersfield, Ventura. **LOUISIANA:** Houma, Lake Charles, New Iberia, Shreveport. **COLORADO:** Sterling. **NORTH DAKOTA:** Williston. **UTAH:** Vernal.





# Finding an Empirical Equation Algebraically

by Ralph F. Nielsen*

WHILE the constants of an empirical equation may for many purposes be determined satisfactorily from slopes and intercepts of a graph (Engineering Fundamentals No. 498) algebraic methods are often preferred.

The form of the equation must be decided upon by various methods of plotting described previously, with the precautions mentioned. For instance, unless the equation is to be used only in the range of the data, the form should be such that reasonable extrapolations are obtained from both ends of the curve drawn through the data.

Also, whether certain trends are evident must be judged from the accuracy or degree of scattering of the points. In the figure, the parabola might come closer to all the points than the other two lines. On the other hand, the value shown by the last point on the right is not evidence of a rise, in view of the scattering of all the points.

If it is a production decline curve it would take the form indicated by the full line. The final curve to be used should be sketched freehand before making use of the plastic curves. When the form of the equation has been determined, the constants may be evaluated by one of the following methods:

**1. Method of slopes and intercepts.** This has been described before as the "graphical" method.

**2. Method of selected points.** As many points, scattered widely over the range of the data, are taken from the smoothed curve as there are constants in the equation. Each point gives a pair of values for P and t (or y and x) which is substituted in the equation form, giving an equation in a, b, etc. Thus a set of simultaneous equations is obtained which can be solved for a, b, etc.

For example, if the equation is of the form $P = at^b$, corresponding values of P and t near the two ends of the curve are chosen. If $P = 2{,}300$ when $t = 5$ and $P = 500$ when $t = 11$, we have, taking logs of both sides,

$$\log 2{,}300 = \log a + b \log 5$$

$$\log 500 = \log a + b \log 11$$

or

$$3.362 = \log a + 0.699\ b$$

$$2.699 = \log a + 1.041\ b$$

whence $b = -1.94$, $\log a = 4.717$, $a = 52{,}100$.

If t has to be "corrected" to a certain reference point to obtain the above form, this must be done first. The method given in Engineering Fundamentals No. 360 may be used, taking the three points from the original smoothed curve. Similarly, if the form is $P = at^b + c$, c must first be determined by the same method.

The constants for the form $P = a\,e^{bt}$ are also found by taking logs, i.e., $\ln P = \ln a + bt$, or $\log P = \log a + bt/2.3$. If the form is $P = a\,e^{bt} + c$, c must be found first by the method mentioned above.

For the parabola, $P = a + bt + ct^2$, three points from the curve, two near the ends and one near the middle, give the three equations in a, b, and c.

**3. Method of averages.** In this method the actual data are used to obtain the constants. The observed points are substituted in the assumed form, giving as many equations in a, b, etc., as they are points. These equations are divided into as many groups as there are constants to be determined, and the equations of each group added. The points may not be arbitrarily divided among groups. For instance, if there are two groups, the points nearest one end of the curve must be in the first group and those nearest the other end in the second group.

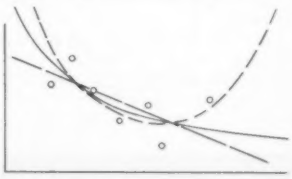


**Fig. 1—Three possible curves through a set of points.**

**Example for Two Groups**

| t: | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| P: | 450 | 450 | 400 | 280 | 270 | 150 |

The form $P = a + bt$ is indicated and we have $450 = a + b$, $450 = a + 2b$, etc. Adding the first three gives $1{,}300 = 3a + 6b$ and adding the second three gives $700 = 3a + 15b$, from which $a = 567$ and $b = -67$. For the parabola, three groups, taken from three portions of the range of the data, would yield three equations on addition. In the case of the above exponential form, logs would have to be used after c was determined. Certain other forms have to be altered before they can be added. The form $P = t/(a + bt)$ would, for example, have to be put in reciprocal form.

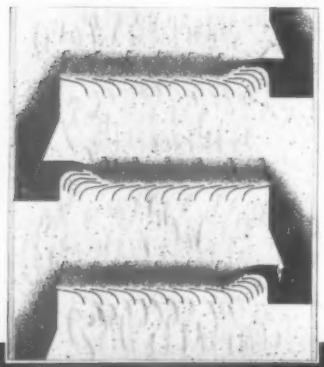
**4. Method of least squares.** This method is based on the premise that the most probable curve is the one that makes the sum of the squares of the deviations from the curve a minimum. Omitting the mathematical theory, the method will be illustrated with the example used for the method of averages. The data are first successively substituted in the form, giving as many equations as there are points: $450 = a + b$, etc. Adding all these gives the first of the equations (called the "normal equations") for determining a and b: $2{,}000 = 6a + 21b$. Now each equation is multiplied by the coefficient of b, giving $450 = a + b$, $900 = 2a + 4b$, $1{,}200 = 3a + 9b$, etc. Adding these gives the second normal equation, $5{,}920 = 21a + 91b$. Solving these for a and b gives $b = -62$, $a = 549$.

As with the method of averages, certain types must first be put in a form suitable for addition. If logs are taken this really means that the sum of the squares of the deviations of the logarithms is a minimum. For the parabola the third normal equation is obtained by multiplying each of the data equations by the coefficient of c, i.e., $t^2$, and adding them.

*Associate professor, petroleum and natural-gas engineering, Pennsylvania State College.

Photo courtesy of Oregon Game Commission

# If high liquid volume is your problem



IT WILL PAY YOU TO INVESTIGATE THE HIGHER LIQUID HANDLING CAPACITIES OF KOCH "BENTURI-TYPE" KASKADE TRAYS...THE DIRECTED SLOT ENERGY ACTUALLY ASSISTS THE LIQUID ACROSS THE TRAY.

## KOCH ENGINEERING COMPANY, INC.

DESIGNERS • MANUFACTURERS • BUILDERS
321 WEST DOUGLAS • WICHITA 2, KANSAS

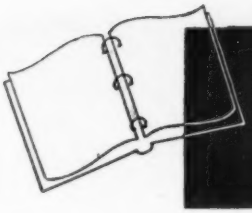
Eastern and Export
30 Rockefeller Plaza
New York City

Pittsburgh, Pa., Repr.
D. D. Foster Co.
412 Peoples Gas Bldg.

Tulsa, Okla., Repr.
Myers-Bogwell Co.
Wright Bldg.

British Associates:
Messrs. A. F. Craig & Co., Ltd.
Paisley, Scotland

No. 141



REFINER'S NOTEBOOK

## ELECTRICAL INSTALLATIONS—1

# Code Requirements

by B. Z. Segall*

**Much detail and know-how goes into the installation of wiring and electrical equipment in refinery and petrochemical plants.**

**A new series which begins with this number of Refiner's Notebook will cover:**

**1. The National Electrical Code.**
**2. Wiring Methods.**
**3. Electrical Equipment.**

**Some of the topics to be discussed are: (1) requirements for hazardous location, explosive limits for gases, explosion-proof equipment; (2) the conduit system, materials of construction, sealing of electrical systems, drains and breathers; (3) transformers and capacitors, lighting fixtures, receptacles and attachment plugs.**

REFINERY projects require all sorts of electrical installations ranging from the relatively simple systems in office buildings located in nonhazardous areas to the highly complicated systems for refinery and petrochemical units and buildings located in hazardous areas. This series will deal primarily with the installations in the hazardous areas.

### Hazardous Locations

Hazardous locations are defined and classified in Article 500 of the National Electrical Code. The three main classifications for hazardous locations are:

Class 1—Locations in which flammable gases or vapors are or may be present in the air in sufficient quantities to produce explosive or ignitible mixtures.

Class 2—Locations in which combustible dusts are present.

Class 3—Locations in which easily ignitible fibers or flyings are present.

A further general classification is set up for locations in which readily ignitible **deposits or residues** from paints, varnishes, lacquers, or other types of finishes may be present. It should be noted that the hazard intrinsically lies in the deposit or residue and not so much in the flammability of the paints, lacquers, etc., during application.

In Article 510 of the National Electrical Code, the requirements for electrical installations in gasoline service stations, bulk stations, etc., are set up in augmentation to the rules of Article 500.

However, the main application for this discussion will be to the Class 1 hazardous locations since these requirements cover the greatest portion of the electrical installations in the operations of producing and refining petroleum and many of its allied chemical products.

*Consulting engineer, New Orleans.

### General Requirements for Class 1

Wiring installations for Class 1 hazardous locations are designed to withstand explosions of the gases and vapors which are inherently a part of the manufacturing process. From a practical and economical standpoint the wiring system cannot be made so vaportight or so gastight as to exclude all these gases and vapors from the conduit lines, switch enclosures, pull boxes, junction boxes, etc., in the electrical system. No matter how tightly the various joints in the system may be made up, the gases and vapors will "breath in" to the system through the screw threads and the many other openings to be found in the enclosures of the electrical wiring system and the electrical apparatus.

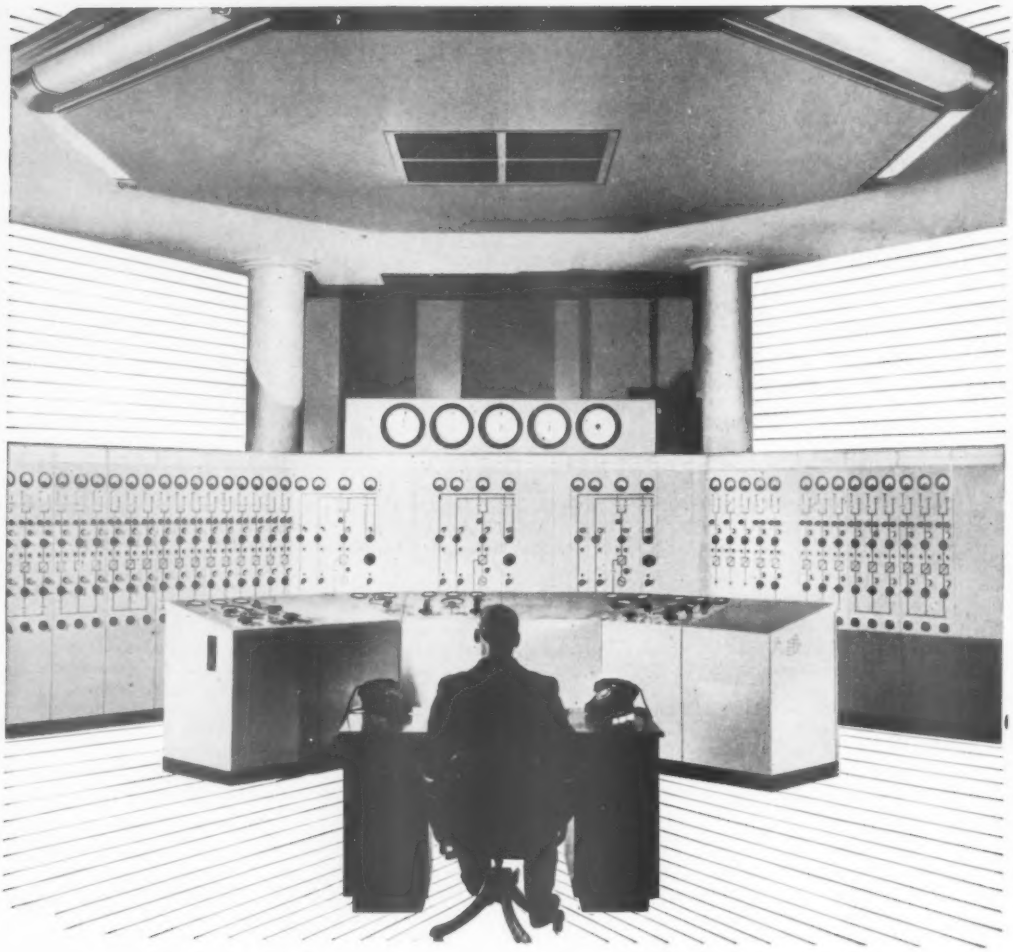
The basic principle of design for the electrical system, therefore, is to have sufficient strength in the various components of the electrical system to resist the pressures from the exploding gases or vapors. These gases or vapors may be exploded, for example, within the various enclosures upon being ignited by the arcing devices which are housed in the enclosures and other cases. These explosions will not disrupt the enclosures, nor cause the conduit system to explode if they are properly designed and installed. By containing these explosions within the system, the possibility of igniting explosive atmospheres in the surrounding and adjacent areas is more or less eliminated.

Furthermore, the electrical equipment is so designed that in "venting" the exploded gases or vapors from the enclosures to the surrounding atmosphere, the hot exploded gases are cooled down to a temperature well below the flash points required to ignite the gases and vapors which may be found in the surrounding outside atmosphere.

### Group Classification—Class 1

The wiring systems within the Class 1 hazardous locations are further subdivided into four groups, namely, Groups A, B, C, and D. This subdivision, in effect, recognizes the variations in explosive characteristics of the various gases and vapors. Broadly, the explosive characteristic of a gas or vapor is defined by its explosive limits, or the characteristic explosive range.

There is a minimum concentration of the gas or vapor in air, below which flame propagation will not occur. Similarly, there is a maximum concentration point beyond which flame propagation cannot be maintained. The range between this low and high-percentage concentration of flammable gases or vapors in air is known as the explosive range for this particular material. This range is more or less characteristic for each gas and will be relatively constant for each gas or vapor at a given atmospheric temperature or pressure.



*The Control Room of the Power House in Anglo-Iranian's Refinery at Grangemouth, Scotland.*

ANGLO-IRANIAN OIL COMPANY, LTD., with its subsidiary and associated concerns, is one of the largest oil companies in the world.

Its principal sources of crude oil production are in the Middle East. Through its prospecting subsidiary, the D'Arcy Exploration Company, it is interested in oil-bearing territories in many other parts of the world.

The Company operates refineries in Great Britain, France, Belgium, Germany, Italy, Israel and Australia. Distribution and marketing of oil products are effected both by the Company itself and through various associated companies throughout the world. For sea transport its shipping subsidiary, the British Tanker Company, operates one of the largest fleets of ocean-going tankers. The Company's principal research establishments are in Great Britain, at Sunbury in Middlesex, and at Kirklington in Nottinghamshire.

THE BP SHIELD IS THE SYMBOL OF THE WORLD-WIDE ORGANISATION OF

# Anglo-Iranian Oil Company LIMITED

REPRESENTATIVE IN U.S.A.: W. D. HEATH EVES, 610 FIFTH AVENUE, NEW YORK 20, N.Y.

# QUESTIONS ON TECHNOLOGY

## Summary of Thermal Cracking Yields

**"Where is a good formula for the yields obtained in thermal cracking? Is there a simple approximate equation?" M. P. D.**

**by W. L. Nelson**
**Technical Editor**

Although thermal cracking is a fairly well-defined process, it is still too complicated to permit a single equation. Yields are basically related to the degradation of the charge stock into a residue that is lower in gravity or deficient in hydrogen. Thus, the gravity of the charge stock less the gravity of the residuum is an important factor. However, the type of charge stock is also important, as notice (1) straightrun or virgin stocks, (2) distillates or gas oils obtained by thermal cracking, and (3) catalytic cycle stocks. Finally, cracking may be practiced for the production of large amounts of cracked distillates as well as gasoline, or it may be carried to the extreme of coking or delayed coking. Accordingly, the following several equations are suggested:

(a) 22.5° to 45° A.P.I. straightrun stocks—

$$\text{Gasoline} = 30 + 2.2\,(A_S - A_T) \quad (1)$$

(b) 7 — 22.5° A.P.I. straightrun stocks—

$$\text{Gasoline} = 15 + 1.25\,(A_S - A_T) \quad (2)$$

Both of these equations apply to either distilled or residual stocks.

(c) Thermal distillates—

$$\text{Gasoline} = 4 + 2.0\,(A_D - A_T) \quad (3)$$

(d) Catalytic cycle stocks—

$$\text{Gasoline} = 8 + 1.7\,(A_D - A_T) \quad (4)$$

(e) Vapor-phase cracking of straightrun stocks—

$$\text{Gasoline} = 23 + 1.4\,(A_S - A_T) \quad (5)$$

(f) Coking residual stocks for gasoline only—

$$\text{Gasoline} = 28 + 1.75\,A_R \quad (6)$$

(g) Coking residual stocks for gasoline and gas oils—

$$\text{Gasoline} = 28\,(1 - X) + 1.75\,A_R - 1.5\,X\,A_G \quad (7)$$

(h) Viscosity breaking for gas oils—

$$\text{Gasoline} = 13 + 2.5\,(A_R - A_T) - X\,[4 + 2\,(A_G - A_T)] \quad (8)$$

In which:

$A_S$, $A_D$, $A_R$ = charge stock A.P.I., of straightrun stocks (S) cracked distillates (D), and residuals (R).
$A_T$ = cracked fuel oil, A.P.I.
$A_G$ = cracked gas-oil product.
$X$ = gas-oil product, liquid volume per cent.
Gasoline = gasoline product, 400° e.p., 10-lb. R.v.p., liquid volume per cent.

It would seem that eight equations would cover the situation but if the true limitations of the equations are to be judged, or the magnitude of gas yields (unaccounted for losses, etc.) is to be known, it is necessary

**TABLE I—COMPARISON OF YIELDS WHEN CRACKING IN VARIOUS WAYS**

| | 26° A.P.I. charge stocks | | | | | 20° A.P.I. charge stocks, 5° A.P.I. resid.—regular thermal cracking | | |
|---|---|---|---|---|---|---|---|---|
| | Catalytic cycle stock, 5° A.P.I. resid. | Vapor phase cracking, 8° A.P.I. resid. | Regular thermal cracking, 8° A.P.I. resid. | Regular thermal cracking, 5° A.P.I. resid. | Coking | 0 per cent G.O. | 30 per cent G.O. | 70 per cent G.O. |
| Unaccounted for volume per cent | 10.5 | 20.7 | 8.5 | 10.1 | 26.5 | 6.7 | 5.0 | 1.5 |
| Gasoline (400° e.p.-10 R.v.p.) | 43.7 | 48.2 | 54.0 | 57.0 | 70.5 | 46.0 | 34.6 | 18.4 |
| Gas oil (22° A.P.I.) | ..... | ..... | ..... | ..... | ..... | ..... | 30.0 | 70.0 |
| Fuel oil | 45.8 | 31.1 | 37.5 | 32.9 | ..... | 47.3 | 30.4 | 10.1 |
| Liquid volume recovery | 89.5 | 79.3 | 91.5 | 89.9 | 70.5 | 93.3 | 95.0 | 98.5 |
| Coke—weight per cent | ..... | ..... | ..... | ..... | 24.7 | ..... | ..... | ..... |
| Coke—tons/1,000 bbl. | ..... | ..... | ..... | ..... | 38.8 | ..... | ..... | ..... |
| Gas—weight per cent | 10.4 | 24.0 | 12.6 | 14.4 | 16.4 | 10.6 | 9.0 | 5.0 |
| Gas—cu. ft./bbl.* | 416.0 | 960.0 | 501.0 | 575.0 | 655.0 | 441.0 | 372.0 | 206.0 |
| Poly gasoline, volume per cent† | 2.4 | 14.3 | 3.0 | 3.4 | 3.8 | 2.6 | 2.2 | 1.2 |

| | 14° A.P.I. charge stocks | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Regular thermal cracking | | | Viscosity breaking, 5° A.P.I. resid. | | Delayed coking | | |
| | 8° A.P.I. resid. | 5° A.P.I. resid. | Coking | 50 per cent G.O. | 70 per cent G.O. | 50 per cent G.O. | 70 per cent G.O. | 80 per cent G.O. |
| Unaccounted for volume per cent | 1.9 | 6.2 | 47.5 | 0 | (—1.2) | 28.2 | 20.5 | 16.8 |
| Gasoline (400° e.p.-10 R.v.p.) | 29.5 | 32.5 | 52.5 | 14.6 | 5.0 | 21.8 | 9.5 | 3.2 |
| Gas oil (22° A.P.I.) | ..... | ..... | ..... | 50.0 | 70.0 | 50.0 | 70.0 | 80.0 |
| Fuel oil | 68.6 | 61.3 | ..... | 35.4 | 26.2 | ..... | ..... | ..... |
| Liquid recovery | 98.1 | 93.8 | 52.5 | 100.0 | 101.2 | 71.8 | 79.5 | 83.2 |
| Coke—weight per cent | ..... | ..... | 39.7 | ..... | ..... | 23.8 | 17.6 | 14.5 |
| Coke—tons/1,000 bbl. | ..... | ..... | 67.2 | ..... | ..... | 40.6 | 29.8 | 24.6 |
| Gas—weight per cent | 5.65 | 9.5 | 19.8 | 4.6 | 2.6 | 11.9 | 8.7 | 7.2 |
| Gas—cu. ft./bbl.* | 244.0 | 408.0 | 855.0 | 198.0 | 111.0 | 512.0 | 374.0 | 310.0 |
| Poly gasoline, volume per cent† | 1.4 | 2.4 | 5.0 | 1.2 | 0.7 | 3.0 | 2.2 | 1.8 |

*Based on molecular weight of 30. †For each 170 cu. ft. of gas, about 1 (liquid volume) per cent of poly gasoline. Vapor-phase gas produces over twice as much.

to refer to the following Questions on Technology:

Straightrun Stocks for Gasoline—"Yields in Noncoking Thermal Cracking," February 25, 1952, p. 183.

Catalytic Cycle Stocks—"Thermal Cracking of Catalytic Cycle Stocks," February 4, 1952, p. 75.

Vapor-Phase Cracking—June 30, 1952, p. 113.

Viscosity Breaking—"Yields in Viscosity Breaking," March 10, 1952, p. 129.

Gravities of Fuel Oils—March 24, 1952, p. 208.

Unaccounted-for Losses — March 31, 1952, p. 114.

Yields by Coking—July 7, 1952, p. 103.

These references were used for the comparison of yields shown in Table 1. Gasoline yields are obviously significant, but the total "liquid recovery" is also significant because of the need of producing gas-oil charge stocks for catalytic cracking.

Equations of the "unaccounted for liquid volume per cent" and the tons of coke per 1,000 bbl. are:

$$\text{Unaccounted} = 0.5\,(A_s - A_1)\,) \quad (9)$$

$$\text{Coke} = 99 - 3.4\,(A_R) + 0.03\,(A_R)^2 \quad (10)$$

These apply only when the major product is gasoline (and fuel oil), not when cracked gas oils are produced.

## Octane Number of Catalytic Gasolines

**"What are the octane numbers of catalytic gasolines? What can we do to increase the octane number?"—S. P. C.**

Probably little can be done to improve or change the octane number of your product unless you are prepared to change operating conditions or to adopt new charge stocks or catalysts. Many factors affect octane number and hence it is necessary to consider each one of them separately. However, Schwarzenbek et al., "Factors Affecting Octane Numbers of Catalytically Cracked Gasolines," Third World Petroleum Congress, Section IV, p. 166, present methods by which all of the factors or influences can be applied, leading to a prediction of what the octane number should be. Their paper yields much of the following information:

(a) **Conversion**—Increase in the volume per cent conversion increases the octane number as indicated in Table 1. Increases are not large but in the extreme they approach four octane units.

(b) **Reaction temperature**—Higher octane numbers are obtained at higher reaction temperatures, although Schwarzenbek et al. indicate a decrease in leaded A.S.T.M. octane number. The magnitude of the increase is indicated in Table 2. The effect is less than was thought to be the situation several years ago (1947).

**TABLE 1—APPROXIMATE INCREASE IN OCTANE NUMBER WITH CONVERSION**

| Conversion volume per cent | A.S.T.M. Oct. No. | | C.F.R.-R. Oct. No. | |
|---|---|---|---|---|
| | | 1.5 cc. | | 1.5 cc. |
| | Clear | TEL | Clear | TEL |
| 40 | 79.2 | 81.2 | 92.7 | 95.8 |
| 50 | 79.8 | 82.0 | 93.6 | 96.8 |
| 60 | 80.5 | 82.7 | 94.6 | 95.7 |
| 70 | 81.7 | 84.3 | 95.4 | 98.5 |
| 80 | 83.7 | | | |

**TABLE 2—APPROXIMATE INCREASE IN OCTANE NUMBER BY OPERATION AT TEMPERATURES ABOVE 800° F.**

| Operating temp., (°F.) | Motor method | | Research method | |
|---|---|---|---|---|
| | Clear | Leaded | Clear | Leaded |
| 800 | 0 | 0 | 0 | 0 |
| 850 | 1.5-2.0 | 0 | 4-6 | 2-3 |
| 900 | 2.5-5.0 | 0-1 | 6-11 | 3-4 |
| 950 | 3-7 | —1 to 1 | 7-13 | 4-7 |

(c) **Recycling**—Increasing the throughput to three times the once-through rate, appears to increase the octane number by only about 2.5 octane number units.

(d) **Feed-stock boiling range**—Increasing the 20 per cent boiling point from 525° to 800° F. appears to decrease the octane number by 2 or 3 units. Widening the boiling range from a slope of 3.3° F. per per cent to a slope of 7.5 decreases the octane number by only the small amount of 0.5-1.0 units.

(e) **Sulfur in feed stock**—High-sulfur feed stocks appear scarcely to harm the octane number of the gasoline. As the sulfur content is increased from 0.3 per cent to even 2.0 per cent, the octane number decreases by only about 1½ units.

(f) **Synthetic catalyst**—Higher octane numbers by 1 to 3 units are obtained with synthetic (as compared with natural) catalyst. Schwarzenbek et al. indicate the larger increase (3 units) for leaded gasolines, whereas some other investigators show only small increases (1 unit) for leaded gasolines.

(g) **Naphtha in feed stock**—Material that boils below 430° F. passes through the reaction zone without being affected to any appreciable extent. Accordingly, the octane number of the total catalytic gasoline product is drastically reduced because it is diluted with low octane straightrun material.

(h) **Steam**—Increasing the process steam from 0 to 20 weight per cent, increases the octane number slightly. This is probably the equivalent of operating at a reduced (partial) pressure.

## Cost of Oil-Field Equipment

**"Have you costs on drilling equipment like the costs that you published in the Cost-imating issue of April 7, 1952?"—J.C.W.**

Few costs or cost relationships are available prior to 1946 except with regard to widely used equipment such as pipe, engines, steel, tanks, etc. However, the Bureau of Labor Statistics, U. S. Department of Labor, in its monthly and yearly issues of "Wholesale Prices" will in the future show the following Oil-Field Machinery indexes of costs:

| | Bureau Index based on 1947-1949 | Based on 1946 costs |
|---|---|---|
| 1946 | 80 approx. | 100 |
| 1947 | 92.9 | 116 |
| 1948 | 100.8 | 125.9 |
| 1949 | 106.4 | 132.9 |
| 1950 | 108.7 | 135.8 |
| 1951 | 119.7 | 149.7 |
| March 1952 | 119.9 | 149.9 |

Costs and indexes on individual items will probably be available later in the year, or in yearly summaries when they become available. The prices of the following equipments and materials are being obtained:

**Code—**

11-5-1-01 Portable drilling rig, cable tool
11-5-1-02 Portable drilling rig, rotary
11-5-1-11 Cable-tool drilling rig, skid mounted
11-5-1-21 Combination socket, 4¼-in. o.d.
11-5-1-22 Sand pump, 5-in. o.d.
11-5-1-31 Crown block, 200-360-ton capacity
11-5-1-33 Traveling block, 200-350-ton capacity
11-5-1-33 Draw works, 7,500-15,000-ft. capacity
11-5-1-34 Rotary table, 12-23-in.
11-5-1-35 Combination hook, 300-ton capacity
11-5-1-36 Rotary slip, 4½-5⅛-in. o.d.
11-5-1-37 Swivel, 100-500-ton capacity
11-5-1-38 Blowout preventer, 10¾ in., 6,000-lb. test
11-5-1-39 Rotary drilling rig, 500-750 rated hp.
11-5-1-41 Rock bit, 8-9-in.
11-5-1-42 Coring equipment
11-5-1-43 Tool joint, 4½-in.
11-5-1-44 Drill collar, 5¾ to 6¼-in.
11-5-1-45 Kelly (drill stem), 4½ to 5½ in. sq. by 54 ft.
11-5-1-46 Rotary fishing tools
11-5-1-51 Cementing equipment
11-5-1-61 Derrick, 128-136 ft.
11-5-1-71 Well head assembly, 600-lb. test
11-5-1-72 Tubing head, 5½ to 7 in. by 2 in.
11-5-1-73 Pumping unit, 11.4 to 33.2 hp.
11-5-1-74 Sucker rod (100 ft.), ¾-in. carbon manganese
11-5-1-75 Deep-well pump, 2 by 1 1/16 in.
11-5-1-76 Slush pump, 250-440 hp.
11-5-1-77 Packer, 4¾ by 7 in. o.d.

# Pipe-Line Construction

PRESENTED below is the status of the pipe-line industry's construction activity showing projects planned, under way, and uncontracted. These projects not yet contracted are preceded by a (•) to differentiate them from those contracted and under way to let the reader know at a glance the major construction work yet to be done. This information is gathered by The Oil and Gas Journal from contractors and pipeline companies first hand and published for your benefit.

### Crude-Oil Pipe Lines

• **California-Oregon Pipe Line System**—103 miles, 6-in., proposed, Crescent City, Calif., to Medford, Oregon.

• **Cities Service Pipe Line Co.**—64 miles, 18-in., planned, Sour Lake, Tex., to Lake Charles, La. Completion date April 1953.

• **Continental Pipe Line Co.**—217 miles, 12-in., planned, Wichita Falls, Tex., to Ponca City, Okla. Completion date 1952.

• **Cooperative Refinery Association.** — 48 miles, 6-in., planned. Phillipsburg, Kans., to Holdredge, Neb. Begin 3-53.

• **Gulf Refining Co.** — 80 miles, 24-in., under way Midland to Colorado City, Tex., Anderson Bros.

22 miles, 10-in., under way, Wortham to Corsicana, Tex., Anderson Bros.

• **Humble Pipe Line Co.**—71 miles, 16-18-in., planned, East Texas to Louisiana-Texas border. (30 miles of 16 in., and 41 miles of 18-in.) Completion date 10-53.

• **Interstate Oil Pipe Line Co.**—22 miles, 18-in., planned, Texas to Shreveport, La.

68 miles, 16-in., planned, Raceland to Anchorage, La. Begin 4-53.

137.6 miles, 22-in., planned, Shreveport to Baton Rouge.

**Interstate Oil Pipe Line Co.**—52 miles, 16-in., under way, Sunset to Anchorage, La. Houston Contracting. Completion date 11-52.

• **Magnolia Pipe Line Co.**—29 miles, 8-in., planned, Midland County, Texas area.

**Malco Refineries, Inc.**—60 miles, 4-in., under way, Pettigrew, Tocito field to Hospah field (San Juan basin, New Mexico).

• **Pan American Pipe Line Co.**—27 miles, 26-in., begin 11-52. Genoa to Texas City, Tex. Completion date 3-53.

47 miles 16-in., begin 12-52, Arden Station in Irion County to Eldorado Station in Schleicher County, Texas. 3-53.

**Pasotex Pipe Line Co.**—195 miles, 8-in., under way, El Paso to Wink, Tex. McVean & Barlow, contractor. Completion date 1-1-53.

• **Phillips Pipe Line Co.**—45 miles, 12-in., planned, Rancho system to Sweeny, Tex. 3-53.

**Phillips Pipe Line Co.**—50 miles, 14-in., under way, looping in Duro and Rankin, Tex. area.

**Platte Pipe Line Co.**—1,075 miles, 16-20-in., under way, Worland, Wyo., to Wood River, Ill. Completion date 1952.

Worland, Wyo., to Holdredge, Neb. R. H. Fulton & Co., contractor. A. A. Carrigan, spreadman at Scotts Bluff, Neb.

Holdredge, Neb., to Kansas State Line, Fulton & Brodie, contractor, J. T. Brodie, spreadman.

Section 7, Missouri River to Salisbury, Mo., and Section 8, Salisbury to Mississippi River, under way. O. R. Burden Construction Co. Al Perry, spreadman at Carrolton, Mo.; river crossing field office, Hartford, Ill. Dick Jernigan, spreadman.

• **Progress Pacific Pipeline Co.** — 1,100 miles, 24-in., planned, Odessa, Tex., to Los Angeles Harbor, Calif.

**Rancho Pipe Line System.**—455 miles, 24-in., under way, McCamey to Houston, Tex. Completion date late 1952. (Joint project with Sinclair Pipe Line Co., Pan American Pipe Line Co., Tidewater Pipe Line Co., Nantucket Pipe Line Co., Phillips Pipe Line Co., and Ashland Pipe Line Co. with Shell Pipe Line Corp. handling construction and operation.)

McCamey to Cedar Valley near Austin, Tex. Anderson Bros. Corp. A. Kilgore, spreadman at Menard, Tex.

(Segment 1)—Austin to Shell's Deer Park Refinery (Houston area). Oklahoma Pipe Line Constructors.

(Spread 1)—Brazos River west to Austin. Houston Contracting Co.

• **Roosevelt Oil & Refining Corp.** — 22 miles, 4 and 6-in., planned, St. Helens to Norwich, Mich.

• **Service Pipe Line Co.**—16-in., planned Bowie, Tex., to Drumright, Okla.

30 miles, 6-in., Knox and Haskell counties, Texas.

29 miles, 4-6-8-in., proposed, Natrona County, Wyoming.

170 miles, 12-in., proposed, Tioga to Williston, N. D.

**Sinclair Pipe Line Co.**—674 miles, 22-24-in., under way, Cushing, Okla., to East Chicago, Ind. Completion date 1952.

Section 1, Drumright-Cushing, Okla., area to Humboldt, Kans. O. R. Burden Construction Co.

(Spread 1) Caney to Humboldt, Kans. A. B. Haynes, superintendent at Chanute, Kans.

(Spread 2) Cushing, Okla., to Caney, Kans. Floyd Lewis, spreadman at Hominy, Okla.

Humboldt, Kans., to Salisbury, Mo. R. H. Fulton & Co., contractor. M. L. Boyd and Jerry Nash, spreadmen.

Salisbury, Mo., to Forest City, Ill. O. R. Burden, contractor.

22-in. Forest City, Ill., to East Chicago, Ind., Britton Bros., contractor.

• **Sterling Pipe Line System.**—53 miles, 12-in., planned, Sterling, Colo., to connection with Platte Pipe Line at Gurley, Neb. (Includes 20 miles, 10-in., main line; 35 miles, 8-in., branch lines). Joint venture comprising Toronto Pipe Line Co., Shell Pipe Line Corp., and Texas Pipe Line Co.

• **Sun Pipe Line Co.**—34 miles, 8-in., planned, Jameson to Colorado City, Tex.

20 miles, 6-in., planned, Claytonville to Colorado City, Tex. Completion date 11-1-52.

• **Texas-Empire Pipe Line Co.**—30 miles, 18-in., planned, Wilmington to Lockport, Ill.

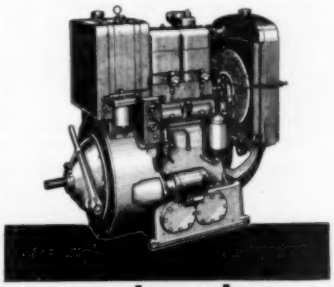
• **Texas-New Mexico Pipe Line Co.**—48 miles, 8-in., planned, from Lovington, N. M.

• **Toronto Pipe Line Co.**—100 miles, 6-10-12-in., planned, Merino, Colo., to Gurley, Neb. Completion date 10-31-52.

• **West Coast Pipeline Co.**—960 miles, 20-22-in., planned, Synder, Tex., to Norwalk, Calif.

**West Texas Gulf Pipe Line Co.**—466 miles, 20-26-in., under way, Colorado City to Sour


*For* LOW COST 'ROUND-THE-CLOCK PRODUCTION PUMPING



. . . depend on NORDBERG Diesel Power Units

NORDBERG "4FS" Diesel Power Units are built in 1, 2 and 3-cylinder sizes, from 10 to 45 H.P. These *heavy duty, medium speed* Diesels are particularly applicable for production pumping jobs, where 'round-the-clock performance is required.

Available as straight power units, with stub shaft or clutch power take-off . . . and as "packaged" generator sets producing from 6 to 30 K.W., Nordberg "4FS" Diesels may be used to power a single pump, or for powering multiple pumps through electric motors.

And remember . . . these compact units are backed by the same reputation for dependability as the larger Nordberg Diesel and Duafuel Engines so widely used for pipe line pumping. Send the coupon for more details.

NORDBERG MFG. CO., Milwaukee, Wisconsin

NORDBERG
BUILDERS OF AMERICA'S LARGEST LINE OF HEAVY DUTY DIESELS

MAIL THIS COUPON TODAY

Nordberg Manufacturing Company
Milwaukee, Wis. 4-152-O

Please send literature describing the full line of Nordberg "4FS" Diesel Power Units.

Your Name_____

Company_____

Address_____

City_____ Zone____ State_____

Lake, Tex. Anderson Bros. Completion date 1-1-53.

(1) Contracted, Middle section from Wortham toward Sour Lake, Tex.

(2) Henderson County to Longview, Tex.

### Products Pipe Lines

• **Bell Oil & Gas Co.**—150 miles, 6-8-in., planned, Ardmore to Drumright, Okla. Completion date 6-1-53.

**Buckeye Pipe Line Co.**—370 miles, 8-12-16-in., under way, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y. (Sections divided as follows: 75 miles, 16-in., 218 miles, 12-in., 77 miles, 8-in.). Completion of 16-in., 1952, balance 1953.

77 miles, 16-in., under way, Macungie, Pa., to Linden, N. J. H. L. Gentry Const. Co. F. K. Morris, spreadman at Manville, N. J. Completion date 10-15-52.

• **Coastal Products Pipe Line Co.**—260 miles, 20-in., proposed, Houston to Baton Rouge.

• **Harbor Products System**—86 miles, 16-in., planned, Philadelphia to Trembley Point, N. J. (Joint ownership of Sinclair Pipe Line Co., Gulf Oil Corp., and Texas Co.)

**Indiana Farm Bureau Cooperative Association, Inc.**—180 miles, 8-in., under way, Mt. Vernon to Indianapolis, Ind. R. B. Potashnick, contractor.

70 miles, 4-in., under way, Indianapolis to Peru, Ind. R. B. Potashnick, contractor.

**Ohio Oil Co.**—255 miles, 8-10-in., East St. Louis, Ill., to Indianapolis. Conyes Const. Completion date 11-52.

**Phillips Petroleum Co.**—50 miles, 8-in., under way, Goldsmith to Spraberry, Tex. McVean & Barlow. Completion date 12-52.

54 miles, 6-in., planned, Goldsmith to Borger, Tex.

52 miles, 10-in., planned, Shell's Brookshire system to Sweeny, Tex.

**Phillips Pipe Line Co.**—35 miles, 6-in., planned, Okmulgee, Okla., to Tulsa. Completion date 12-52.

**Pioneer Pipe Line Co.**—(Continental Pipe Line Co. and Sinclair Pipe Line Co.). 310 miles, 8-in., under way, Sinclair, Wyo., to Salt Lake City, Utah.

• **Progress Pacific Pipe Line Co.**—900 miles, 10-in., proposed, California to West Texas.

**Salt Lake Pipe Line Co.**—330 miles, 8-in., contracted, Salt Lake City to Boise, Idaho. Macco Corp., and Engineers, Ltd.

**Shell Oil Co.**—565 miles, 8-14-in., under way, Wood River via East Chicago to Detroit. R. B. Potashnick, coutractor on Wood River—E. Chicago portion of project.

• **Sinclair Pipe Line Co.**—12-in., planned Sinco to Port Arthur, Tex.

• **Standard Oil Co. (Ind.).**—316 miles, 12-in., proposed, Sugar Creek refinery to Dubuque, Iowa. Completion date 1-1-53.

243 miles, 10-12-in., proposed, Whiting, Ind., to River Rouge, Mich.

**Sun Pipe Line Co.**—110 miles, 8-in., under way, Fostoria to Hudson, Ohio.

**Tuscarora Oil Co.**—27 miles, 12-in., under way, Allentown to Reading, Pa.

• **United States Pipe Line Co.**—1,600 miles, 14-22-24-in., proposed, Port Neches, Tex., to Newark, N. J. (Includes 560 miles, 25-in., Port Neches to Jackson, Tenn.; 120 miles, 14-in., lateral to Paducah, Ky., and 1,045 to Newark).

• **Wolverine Pipe Line System**—200 miles, 14-in., planned, Chicago to Toledo and Detroit. (Joint ownership of Shell, Texas, and Cities Service).

### Natural-Gas Pipe Lines

• **Algonquin Gas Transmission Co.**—202 miles, 3 to 16-in., under way, Conn., R. I., and Mass. Associated Pipe Line Contractors and Williams Bros. Co. Completion date 10-20-52.

• **Allied Gas Co.**—24 miles, 6⅝-in., proposed, McLean to Champaign County, Illinois.

• **Arkansas-Missouri Power Co.**—140 miles, 2 to 10-in., planned, St. Francis River, Clay County, Arkansas, to near Campbell, Mo.

• **Associated Natural Gas Co.**—88 miles, Missouri.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

• **Chattahoochee Natural Gas Co.**—70 miles, proposed, Floyd County, Georgia, to Dalton, Ga.

**Cities Service Gas Co.**—179 miles, 4-30-in., gathering system in vicinity of Ulysses, Kans. Vaughn & Taylor Construction Co., Inc. D. D. Vaughn, spreadman, Ulysses.

15 miles, 20-in., Craig County, Oklahoma, to Lawrence County, Missouri.

**Cities Service Gas Co.**—21 miles, 26-in., planned, Franklin and Anderson counties, Kansas.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

**Colorado Interstate Gas Co.**—250 miles, 20-in., under way, Kit Carson, Colo., to Amarillo, Tex. R .H. Fulton & Co., contractor. Jerry Nash spreadman at Lamar, Colo.

Pueblo County to Fowler, Colo.

• **Commonwealth Natural Gas Corp.**—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

• **Cumberland and Allegheny Gas Co.**—31 miles, 12-in., proposed, Garrett County, Md., to Keyser, W. Va.

**Dow Chemical Co.**—70 miles, various sizes, Midland, Saginaw, and Bay City, Mich. Mahoney Contracting Co., contractor. Ralph Bucher, spreadman at Midland.

• **East Tennessee Natural Gas Co.**—172

**It's a TRANSITE PIPE salt water disposal line!**

Corrosion meets its match when you specify Transite* Pipe for your salt water disposal lines. Under corrosive conditions so severe that other pipe materials have failed in months, this modern pipe has provided years of dependable service.

There are two good reasons for this: First, Transite Pipe is made of asbestos, cement and silica—all corrosion resistant materials. Secondly, it is steam-cured for durability. The result is a pipe that is remarkably resistant to corrosive action of salt water on the inside, corrosive soil on the outside.

But Transite has *other* cost-reducing features as well! Its light weight eases handling and installation . . . most sizes can be unloaded and lowered into the trench without mechanical handling equipment. The factory-made Simplex Couplings speed assembly . . . and provide tight, yet flexible joints. And, in addition, Transite's high carrying capacity helps to keep your pumping costs low.

Transite Pipe for salt water disposal lines is made in a full range of diameters to meet all requirements. You can get further information by writing to Johns-Manville, Box 60, New York 16, N. Y.

*Reg. U. S. Pat. Off.

**Johns-Manville TRANSITE PRESSURE PIPE**

miles, 22-in., planned, Greenbrier to Oak Ridge, Tenn.

100 miles, 16-in., proposed, Knoxville to Kingsport, Tenn.

• **El Paso Natural Gas Co.**—822 miles, proposed, Permian Basin, N. M., and West Texas.

181 miles, proposed, field transmission lines.

97 miles, proposed, main transmission line on San Juan Basin, N. M. to California.

**El Paso Natural Gas Co.**—133 miles, 30-in., under way, Kermit, Tex., to Colorado River, Company Crews. Completion date, December 1952.

•**Fredericksburg Natural Gas Co.**—29 miles, 3-4-in., planned, Fredericksburg, Va., area.

• **Georgia Gas Co.**—32 miles, 4½-in., proposed, Bogart to Gainesville, Ga.

• **Glacier Gas Co.**—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

120 miles, 16-in., proposed, Spokane to Hanford, Wash.

91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

• **Gulf Interstate Gas Co.**—860 miles, 30-in., proposed, Acadia Parish, La., to Boyd County, Ky.

329 miles, 12 to 24-in., proposed. Laterals off Acadia Parish, Louisiana, to Boyd County, Kentucky, line.

• **Home Gas Co.**—32 miles, 12-in., planned, Breesport to Union Center, N. Y.

17 miles, 12-in., proposed, loops from Hancock to Sanford, N. .

46 miles, 12-in., proposed, Tioga and Broome counties, New York.

• **Hope Natural Gas Co.**—33 miles, 8-10-12-in., planned, Wyoming County, West Virginia, south to Buchanan County, Virginia.

**Iowa-Illinois Gas & Electric Co.**—41 miles, 10-in., planned, Washington County to Cedar Rapids, Iowa.

• **Kansas-Nebraska Natural Gas Co., Inc.**—179 miles, planned, Kansas and Nebraska.

18 miles, 6-8-in., planned, McCook, Neb., south. Completion date 1952.

54 miles, 4-6-in., planned, Neligh to Hartington, Neb. Completion date 1953.

20 miles, 12-in., planned, Atwood to near Oakley, Kans. Completion date 1952.

**Kansas-Nebraska Natural Gas Co., Inc.**—49 miles, 10-in., under way, Ogallala to North Platte, Neb. Engineering Const. Co. Completion date 1952.

• **Kansas Power & Light Co.**—27 miles, 20-in., planned, Pratt, Kans., to Calista compressor station.

28 miles, 12-16-in., planned, north of Kansas to Meade County gas field.

• **Lake Shore Pipe Line Co.**—75 miles, 10¾-in., under way, T.G.T. connection at Cochranton, Pa., to Fairport via Ashtabula, Ohio.

• **Lone Star Gas Co.**—100 miles, proposed, storage fields to the Dallas-Fort Worth area.

35 miles, 12-in., proposed, southeastern Schleicher County. 12-52.

**Lone Star Gas Co.**—70 miles, 20-in., under way, Garvin County, Oklahoma, to Clay County, Texas. 12-52.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington, and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

• **Michigan Gas Storage Co.**—30 miles, 26-in., planned, Laingsburg Junction north.

• **Midsouth Gas Co.**—191 miles, planned, Helena to Palestine, Ark.

• **Mississippi River Fuel Corp.**—98 miles, 16 and 18-in., planned, feeder line from Lincoln Parish, Louisiana, to Waskom field, Harrison County, Texas.

40 miles, 18-in., planned, Dubach to Perryville, La.

**Missouri Central Gas Co.**—25 miles, 6-in., contracted, Moberly to Macon, Mo. L. R. Young Const. Co.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

• **Montana Power Co.**—52 miles, 16-in., planned, Canada-Montana border to Cut Bank, Mont.

• **Morganfield Natural Gas Co.**—31 miles, 4-6-in., planned, through Sturgis, Providence, Clay, Diamond, Wheatcroft, and Sullivan, Ky.

• **Natural Gas Storage Co. of Illinois.**—43 miles, 30-in., proposed, Kankakee and Iroquois counties, Illinois.

• **Nevada Natural Gas Pipe Line Co.**—114 miles, 10-in., planned, Topock, Ariz., to Las Vegas, Nev.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virginia, to Narrows and Dublin, W. Va.

• **New York State Electric and Gas Co.**—59 miles, 8-10-24-in., proposed, Oneonta and Norwich to DeRuyter, N. .

**New York State Natural Gas Corp.**—104 miles, 14, 16, 20-in., under way, looping on Westmoreland, Armstrong, and Tioga counties, Pennsylvania. (Includes 17 miles, 16-in., in Potter County, Pennsylvania, and 21 miles 14-in., replacement in Line No. 507, New York.)

Utica to Amsterdam, N. Y. (to begin at completion of Zelienople). Williams-Austin. Howard Bauer, superintendent. Completion in 90 days.

Angelica to Rossburg, N. Y. (begin at completion of Cayuta-Ithaca). Williams-Austin.


# READY TO SERVE YOU IN ALL PHASES OF YOUR CANADIAN OIL OPERATIONS

Accounts for pay operations on the job.

"YOUR MANAGER"

Liaison Service for oil men.

"YOUR MANAGER"

Conversion funds for imported equipment.

"YOUR MANAGER"

- Payroll Accounts in the Fields
- Foreign Exchange for Equipment
- Letters of Credit
- Information and Advice
- Complete Oil Banking Services

The Bank of Toronto has fully qualified and experienced oil bankers to serve your interests at the core of Canada's richest oil boom. All our services are at your disposal to give complete, on-the-spot attention to every phase of your Canadian oil interests.

Write today for full particulars—you'll appreciate our Canadian contacts in the Canadian oil industry:

A. R. Profit, Manager, The Bank of Toronto, *Calgary, Alberta, Canada*

I. J. Hutton, Manager, The Bank of Toronto, *Edmonton, Alberta, Canada*

Oil Representative, P. W. Atkinson, *Calgary Branch*

THE BANK OF TORONTO

*Incorporated 1855*

Howard Bauer, superintendent. Completion in 45 days.

Colesburg Junction to Sabinsville, Pa. (begin at completion of Angelica job), Williams-Austin. Howard Bauer, superintendent.

21 miles, Columbiana and Stark counties, Ohio.

• **New York State Natural Gas Co.**—95 miles, 16-20-in., planned, Clinton County to Armstrong County, Pennsylvania.

(Section 1) 16-in., Clinton County, Pennsylvania.

(Section 2) 20-in., Armstrong County, Pennsylvania, begin 1953.

29 miles, 20-in., begin 11-1, looping from Tonkin Station to Kittanning, Pa. Williams-Austin Co. Completion date 12-15-52.

• **Northeastern Gas Co.**—411 miles, proposed. New England towns.

• **Northern Natural Gas Co.**—580 miles proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

210 miles, 26-in., planned, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

400 miles, 24-in., proposed, Emerson, Manitoba south to Red River Valley through Fergus Falls on to St. Paul, Minn.

102 miles, planned, extension.

**Northern Natural Gas Co.**—140 miles, 4-6-8-in., under way, south of Rolla, Kans., to Guymon, Okla. Reese Bros. Const. Co. E. H. Reese, spreadman at Hugoton, Kans.

• **Northern Indiana Fuel & Light Co.**—33 miles, 8-in., proposed, Edgerton to Auburn, Ind.

• **Northwest Natural Gas Co.**—750 miles, planned, Washington, Oregon, and Idaho.

24-in., Eastport, Idaho, to Monroe, Wash.

18-in., Monroe to International boundary near Lynden, Wash.

22-in., Monroe to near Seattle, Wash.

20-in., Seattle to Portland, Ore.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox, and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

• **Oklahoma Natural Gas Co.**—50 miles, 18-in., planned, Sapulpa to Choteau, Okla. 7-53.

20 miles, 8⅝-in., planned, Wewoka, Okla., south. 12-1-52.

• **Pacific Gas & Electric Co.**—50 miles, 12-16-20-in., planned, Fresno to Merced, Calif.

(Section 1) 16-in., Burrel to near Easton, Calif.

(Section 2) 20-in., Holm to Topock-Milpitas line.

(Section 3) 12-in., parallel existing Madera-Livingston line.

141 miles, 34-in., planned, parallel sections along Topock-Milpitas line.

Planned, Monterey to Fort Ord to Castroville; Napa Wye to Shellville; Cotati to Santa Rosa, Calif.

• **Pacific Northwest Pipeline Corp.**—1,384 miles, proposed, Ignacio, Colo., to Bellingham, Wash.

316 miles, proposed, laterals and spurs off main line to Pocatello, Idaho to Yakima, Wash.

**Panhandle Eastern Pipe Line Co.**—70 miles, 24-26-in., under way, looping from Sweetwater, Tex., to Emporia, Kans.

174 miles, 30 and 26-in., contracted. Tuscola, Ill., eastward—looping present system. R. A. Conyes, contractor.

26-in., Edgerton, Mich., Anderson Brothers.

30-in., looping in Tuscola, Ill.

30-in., looping in Montezuma, Ind.

30-in., looping in Zionsville, Ind.

• **Panhandle Eastern Pipe Line Co.**—19 miles, planned, Peoria County, Illinois.

**Pennsylvanian Gas Co.**—52 miles, 12-in., between Warren and Erie, Pa. Section 1—27 miles, under way and contracted by Harford Brothers. Section 2—25 miles.

• **Peoples Natural Gas Co.**—25 miles, proposed, Cambria and Blair counties, Pennsylvania.

• **Permian Basin Pipeline Co. (Northern Natural).**—384 miles, 20-30-in., proposed, Permian Basin and eastern New Mexico to Skellytown, Tex.

Upton County, Texas, to Lea County, New Mexico.

Lea County to Roosevelt County, New Mexico.

Roosevelt County, New Mexico, to Carson County, Texas.

• **Phillips Petroleum Co.**—125 miles, 2 to 24-in., planned, Midland, Upton, Glasscock, and Reagan counties, Texas. Completion date 3-53.

28 miles, 10-in., planned, Bayou Plant to Adams Terminal. Completion date 7-53.

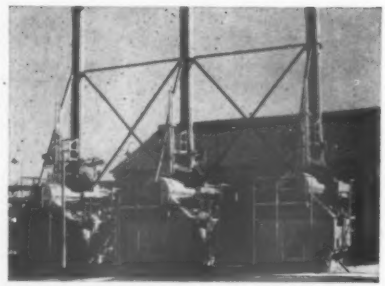
**Phillips Petroleum Co.**—65 miles, 4 to 30-in., under way, Goldsmith field system, Texas. George Tucker, const. Completion date 1-53.

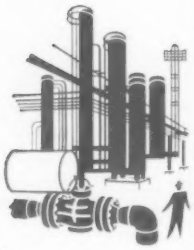
75 miles, 4-30-in., under way, Upton and Reagan counties, Texas. Vaughn & Taylor, 11-52.

• **Public Service Co. of Colorado.**—95


WICKES*

*WICKES steam generators are cutting costs in America's finest refineries and natural gasoline plants





In scores of refineries and natural gasoline plants, Wickes Type A Steam Generators have helped speed processing and considerably reduce production costs. They operate at a high degree of efficiency and maintenance costs are unusually low. Wickes can fill your requirements for all types of multiple drum boilers up to 250,000 lbs. steam per hour at 1000 psi.—adaptable to any standard method of firing. Units capable of sustained steam production up to 35,000 lbs. per hour at 1000 psi. can be shop-assembled for immediate installation. Write today for descriptive literature or consult your nearest Wickes representative.

THE WICKES BOILER CO.

SAGINAW, MICHIGAN

DIVISION OF THE WICKES CORPORATION

SALES OFFICES: Atlanta • Boston • Buffalo Chicago • Cincinnati • Cleveland • Denver • Detroit Greensboro, N. C. • Houston • Indianapolis • Los Angeles • Memphis • Milwaukee • New York City Pittsburgh • Portland, Ore. • Saginaw • San Francisco • Springfield, Ill. • Tampa, Fla. • Tulsa Washington, D. C.

*Recognized Quality Since 1854*

143

miles, proposed, Douglas Creek and other gas fields to Grand Junction, Colo., area.

• **Public Service Co. of North Carolina.**—83 miles, 8-in., planned, Kings Mountain to Asheville, N. C. Completion date 3-1-53.

• **Rockland Light & Power Co.**—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

• **Shenandoah Gas Co.**—39 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va.

• **South Carolina Natural Gas Co.**—160 miles, 16-12-10-in., proposed, Aiken, S. C., to cities of Columbia, Summerville, and Charleston, S. C.

• **South Georgia Natural Gas Co.**—339 miles, 2-12-in., planned, Phoenix, Ala., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga. (b) 10-in., Albany, Ga., to Moultrie, Ga. (c) 8-in., Moultrie, Ga., to Tallahassee.

• **Southern California Gas Co.**—35 miles, planned, Antelope Valley, California.

• **Southern California Gas Co. and Southern Counties Gas Co. of California.**—45 miles, 30-in., proposed, looping on line from Arizona border to Los Angeles.

81 miles, 30-in., proposed, Whitewater to Desert Center, Calif.

Planned, looping between Blythe and Colorado River and on westward of Indio.

• **Southern Natural Gas Co.**—1,235 miles, 24 to 4½-in., proposed, Louisiana, Mississippi, Alabama and Georgia, and South Carolina. Houston Contracting and H. C. Price.

169 miles, loops, planned Ouachita Parish, Louisiana, to Augusta, Ga.; (20 miles in Ouachita Parish, 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 108 miles, 14-in., Bass Junction to Augusta, Ga.)

**Southern Natural Gas Co.**—88 miles, 24-in., Mississippi and Alabama.

(1) vicinity of Louisville, Miss. Houston Contracting.

(2) Reform, Ala., to Warrior River. Houston Contracting.

• **Southern Union Gas Co.**—21 miles, 20-in., planned, Albuquerque, N. M.

27 miles, 10-in., planned, Lea and Eddy counties, New Mexico.

**Southern Union Gas Co.**—30 miles, 12-20-in., contracted, San Juan County, New Mexico. R. H. Fulton & Co.

• **Southwest Gas Corp., Ltd.**—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

• **Texas Eastern Transmission Corp.**—315 miles, 24-in., proposed, Provident City, Tex., to Castor, La.

• **Texas Gas Transmission Corp.**—400 miles, 26-in., planned, looping from Bastrop, La., to Hardinsburg, Ky.

180 miles, 26-in., Acadia Parish to connection with existing facilities in Morehouse Parish.

35 miles, 12-in., Slaughters, Ky., to Evansville, Ind.

560 miles, 26-in., proposed, Louisiana and Kentucky.

**Texas Gas Transmission Corp.**—363 miles, 26-in., under way, Mississippi River near Greenville, Mississippi to Jeffersontown Station, Ky. H. C. Price Co. Completion date 11-15-52.

26-in., under way, Bastrop, La., to north of Mississippi River. E. C. Norris, superintendent. Houston Contracting.

• **Texas-Ohio Gas Co.**—1,435 miles, 30-in., proposed, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va. Completion date 6-30-53.

• **Union Oil Co. of California.**—40 miles, 8-10-in., planned, San Joaquin Valley and Los Angeles basin

• **United Fuel Gas Co.**—50 miles, 20-24-in., proposed, Wood County to Lanham, W. Va.

Planned, Lirette field to Harvey, La.

**Union Gas Pipe Line Corp.**—124 miles. Sterlington compressor station, near Monroe to Jackson, Miss.

23 miles, 8-12-16-in., South Louisiana facilities.

River Const. Corp., a joint venture including Oklahoma Contracting Co.; J. Ray McDermott & Co., Inc., and Morrison-Knudson Inspection by Brown & Root, Inc.

• **United Gas Pipe Line Co.**—53 miles, 24-in., planned, Texas.

20-in., planned, Ship Shoals to Terrebonne Parish, Louisiana.

**Virginia Natural Gas Co.**—153 miles Buckingham to Richmond and Portsmouth, Va

**Westcoast Transmission Co., Ltd.**—(See foreign natural gas pipe lines).

**Western Kentucky Gas Co.**—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

• **Western Pipe Lines.**—1,200 miles, 22-in., planned, southern Alberta to Duluth, Minn

• **West Texas Gas Co.**—16 miles, 16-in. planned, looping from Canyon to Happy, Tex. 11-1-52.

• **Wilcox Trend Pipe Line Co.** (Harry Bass Drlg. Co.)—150 miles, various up to 20-in., planned, gathering system for delivery to proposed Texas Eastern terminal at Provident City, Tex.

### Foreign Crude-Oil Pipe Lines

• **Basrah Petroleum Co.**—72 miles, 24-in.,

When you buy STURDYBILT Prefabricated Houses you need never to lose your original investment. Any STURDYBILT House can be moved to your new site, or sold to another company for erecting on its lease.

Check the advantages of STURDYBILT houses, garages, warehouses, tool houses and other buildings before you buy any oil field housing.

■ WRITE FOR INFORMATION

♦ MANUFACTURERS OF SPECIAL MILLWORK: DISTRIBUTORS OF JOHNS-MANVILLE BUILDING MATERIALS; CURTIS WOODWORK

**STURDYBILT** PREFABRICATED, DEMOUNTABLE HOUSES

SOUTHERN MILL & MANUFACTURING CO. • TULSA, OKLAHOMA

STURDYBILT HOUSES COMPLY WITH COMMERCIAL STANDARD CS125 OF THE NATIONAL BUREAU OF STANDARDS FOR PREFABRICATED HOMES

planned, Zubair to Fao. Begin May 1953.

**Canadian Gulf Pipe Line Co.**—115 miles, 4-6-12-in., under way, Big Valley and Fenn fields to Stettler field, Edmonton, Alta., Canada. Anderson International Contractors, Ltd.

• **Cia. de Petroleo Ganso Azul, Ltd.**—48 miles, 4-in., planned, Ganzo Azul field to Pucalpa on upper Ucayali River, Peru.

**Creole Petroleum Corp.**—143 miles, 26-in., under way, Ule (State of Zulia) to Amuay (State of Falcon). Williams Bros. de Venezuela, S. A., contractor of overland sections. general superintendent, Maracaibo. McWilliams, Gahagan, and Anderson Brothers, contractors of water crossings. Completion date March 1953.

• **Creole Petroleum Corp.**—25 miles, 34-in., planned, Lagunillas to La Salina (State of Zulia). Completion date April 1953.

**Direccion General de Yacimientos Petroliferos Fiscales.**—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

**Interprovincial Pipe Line Co.**—100 miles. 16-in., contracted, Regina, Sask., to Gretna, Man., Canada. Anderson International Contractors, Ltd.

**Iraq Government.**—135 miles, 12-in., from Iraq Petroleum Co. at Baija to Baghdad, Iraq. Construction 1952. M. W. Kellogg, contractor.

• **Mene Grande Oil Co.**—12 miles, 26-in., Anaco to Puerto La Cruz.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

• **Saskatoon Pipe Line, Ltd.**—56 miles, 6-in., planned, Milden to Saskatoon, Sask.

**Texas Petroleum Co.**—60 miles, 4-6-in., under way, Pta. Nino to La Dorada.

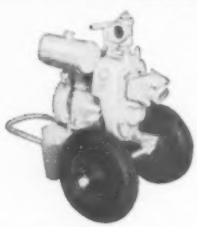

DUAL PRIME AND STRAIGHT CENTRIFUGAL

PUMPS

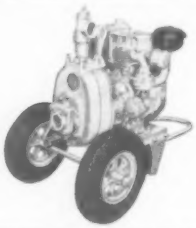
Include

CLOSE-COUPLED CONSTRUCTION
SELF-ADJUSTING ROTARY SHAFT SEALS
HYDRAULICALLY BALANCED IMPELLERS

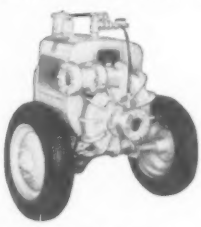
MODEL 21 2" PUMP 1 H.P.
DUAL PRIME
25 GPM @ 27 PSI 60 GPM @ 17 PSI



MODEL 24 2" PUMP 4 H.P.
DUAL PRIME
50 GPM @ 39 PSI 125 GPM @ 30 PSI



MODEL 2H7 2" PUMP 7 H.P.
DUAL PRIME HI-HEAD
30 GPM @ 100 PSI 60 GPM @ 69 PSI



MODEL SS3H25 3" PUMP 25 H.P.
PRESSURE-FLO
200 GPM @ 122 PSI 400 GPM @ 70 PSI

FOR INFORMATION ON OTHER MODELS OF THE EXTENSIVE CMC LINE OF PUMPS, CONTACT YOUR NEAREST CMC SUPPLY STORE OR . . .

3340 Dixie Drive, Houston 21, Texas Phone Linden 3988

Construction Machinery Co's. Waterloo, Iowa


**Trans Mountain Oil Pipeline Co.**—711 miles, 24-in., under way, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers.

(Spread 1) Acheson to Lake Yellowhead. Comstock Midwestern.

(Spread 2) Lake Yellowhead to Blue River Comstock Midwestern.

(Spread 3) Vicinity of Vavenby, Mannix, Ltd.

## Foreign Products Pipe Lines

**Columbia Ministry of Petroleum**—100 miles, 8-in., contracted, Contemplara to Pto. Salgar, Williams Bros. Corp.

75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia, Carolina Construction Co.

• **Empresa Nacional del Petroleo**—80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

**Empresa de Ferrocarriles Ecuatorianos.**—50 miles, 6-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

**Societe des Petroles au Congo. (Sub Cie. Financiere Belge des Petroles, S.A.).**—225 miles, 6-in., under way, Ango-Ango to Leopoldville, Belgian Congo. Completion date 2-53.

**Societe des Transports Petroliers par Pipe Line.**—160 miles, 10-in., under way, Le Havre to Paris, France. Entrepose, contractor. Completion date 1953.

**Trans-Northern Pipe Line Co.**—440 miles, under way, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada. Contracted by Mannix-Williams Bros, Ltd.

Kingston to Toronto. Sparling Davis.

Kingston to Montreal and branch line to Ottawa. Williams Bros.

## Foreign Natural-Gas Pipe Lines

• **Azienda Generale Italiana Petroli.**—110 miles, 12-14-16-in. Start 11-52. Cortemaggiore to Genoa. Completion date 11-53.

**Azienda Generale Italiana Petroli**—90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

**Direccion General del Gas del Estado.**—310 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

• **Empresa Nacional del Petroleo**—80 miles, 10¾-in., planned, Concon to Santiago, Chile.

• **Northwest Natural Gas Co.**—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

• **Petroleos Mexicanos.**—205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

**Petroleos Mexicanos.**—260 miles, 20-in., considered, Monterrey to Tampico and Poza Rica, Mexico.

Under way, Salamanca to Guadalajara, Mexico.

• **Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.**—600 miles, planned, Reynosa, Tamaulipas, to Tampico-Poza Rica, Mexico.

• **Trans-Canada Pipe Lines, Ltd.** (Canadian Delhi Oil Co.)—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in. gathering system in Alberta.

**Union Gas Co. of Canada, Ltd.**—40 miles, 8-10-in., under way, Dawn Township to London, Ontario. F. E. Shaw, Ltd. Completion date 11-15-52.

• **Westcoast Transmission Co., Ltd.**—1,110 miles, 24-in., planned, Dawson Creek, B. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

138 miles, 20-in., planned, Sumas to Tacoma, Wash.

139 miles, 18-in., planned, Tacoma, Wash., to Portland, Ore.

• **Western Pipe Lines.**—833 miles, 24-in., proposed, from southern Alberta, eastward across the Canadian prairies, serving principal towns and cities along the route to a point near the International boundary.

# Tanker Deal Illegal

## Court rules surplus vessel was resold to foreign interests in violation of law; Government may recover over 50 ships

WASHINGTON. — A ruling by the federal District Court in Alexandria, Va., that a tanker purchased from the old Maritime Commission was resold to foreign interests in violation of the shipping laws may pave the way for the Government to recover about 50 oil and cargo vessels.

The tanker involved in the court case was one of three purchased from the Maritime Commission by a group headed by former Massachusetts Congressman Joseph E. Casey. An investigation of the transaction was started by the Senate investigating committee and early this year the Department of Justice sued to recover the tanker, which had been transferred to the China International Foundation, Inc., headed by Newbold Morris.

The Alexandria court held that the tanker was in fact a Chinese ship as a result of its transfer to corporations owned and controlled by Chinese interests after its original purchase from the Government. The shipping laws prescribe that such surplus vessels should remain in the hands of American citizens or corporations under American citizen control.

**Subject to forfeiture . . .** Judge Albert V. Bryan ruled that neither the United Tanker Corp., which bought the vessel from the Casey group, nor the foundation to which beneficial ownership was later transferred were citizen corporations within the meaning of the law and held the vessel was subject to forfeiture the day it was sold to United Tanker Corp. Its subsequent transfer to the foundation did not redeem the ship because it already had sailed under false colors. He held that the foundation, a nonprofit organization to finance education and scientific projects for the benefit of Chinese, was of such foreign cast as to be ineligible to acquire surplus government vessels.

In its report last June, the Senate investigating committee charged that five other tankers obtained by the Casey group had been transferred to Greek ownership and suggested that many other surplus vessels were no longer in American ownership.

The Alexandria decision will not directly affect the vessel, which was sold under court supervision after it was seized last November 1. But if upheld by the higher courts, to which appeal is expected to be taken, the Government will collect the $1,950,000 realized from the sale and impounded by the court.

A tabulation by the Senate committee indicated that at least 47 vessels, including a number of tankers, had eventually found their way into foreign hands after purchase from the Maritime Commission.


**HENRY H. PARIS DISTRIBUTOR Inc.**

Manufacturer's Agent - Oil Well and Refinery Supplies

P. O. BOX 932 HOUSTON, 1125 ROTHWELL ST. TEXAS

*Agent and Distributor for the following Nationally Known Manufacturers:*

**WHEELING MACHINE PRODUCTS CO.**
**Wheeling, West Virginia**
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

**VOLCANO BURNER COMPANY**
**Houston, Texas**
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

**THE OHIO INJECTOR COMPANY**
**Wadsworth, Ohio**
OIC VALVES Bronze, Iron, Cast and Forged Steel for all purposes.

**HARRISBURG STEEL CORPORATION**
**Harrisburg, Pennsylvania**
Forged Steel Flanges and Seamless Casing Couplings.

**GLOBE MACHINE & NIPPLE CO.**
**Houston, Texas**
Arrow Brand Pipe Nipples—All Kinds.

**DRESSER MANUFACTURING DIV.**
**Bradford, Pa.**
Seamless Welding Fittings.

**OIL STATES EQUIPMENT COMPANY**
**Houston, Texas**
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

PERRAULT

PERRAULT-AMERICAN TAR-HEATING KETTLES

Available in all capacities from two barrels through thirty barrels. Large capacity tar kettles completely insulated on all four sides, equipped with mechanical agitation, Hauck fuel-injection type burners and Roots-Connersville blowers. For information regarding Perrault-American Tar Heating Kettles contact—

PERRAULT Brothers Inc.
1130 NORTH BOSTON • TULSA 6, OKLAHOMA
TELEPHONE 5-1103 • EXPORT OFFICE, 30 ROCKEFELLER PLAZA, NEW YORK 20, N.Y. PHONE CIRCLE 6-6260

*Everything for the Pipeliner*

MOLE
Pipeline
Cleaner

for BETTER cleaning of
CRUDE LINES
PRODUCT LINES
NATURAL GAS LINES

*FOR DETAILS WRITE*

Pipeline Cleaners Co.
Fort Madison, Iowa

# PIPE LINES

## Contracts Let on 833 Miles Of Southern Natural Lines

BIRMINGHAM.—Southern Natural Gas Co. has let contracts covering construction of 833 miles of gas lines in Louisiana, Mississippi, Alabama, Georgia, and South Carolina to Houston Contracting Co., Houston, and H. C. Price Co., Bartlesville, Okla.

These contracts represent a major portion of a $76,000,000 construction program planned by Southern Natural over the next 3 years. The entire program involves laying 1,254 miles of new lines and installing 22,250 hp. in compressor units. This will increase the company's daily deliveries of gas to 1,020,000,000 cu. ft. by 1954.

Houston Contracting will put two spreads at work on 88 miles of mainline loops the latter part of this month. Price expects to start two spreads early next year, while Houston will jump its working spreads to four. Completion date for the entire 833 miles of lines is set for December 1, 1953.

The contracts just let comprise all of Southern Natural's 1952-53 expansion program with the exception of certain lines west of the Mississippi River and south of Lake Pontchartrain in southeastern Louisiana.

Included in the Houston, Price contracts are 352 miles of 24-in., 115 miles of 20-in., 239 miles of 16-in., 127 miles of 14-in., and multiple crossings of 16 major rivers.

### Crossing the Salt Flats

**Work on one of the key pipe-line expansion projects in the Southwest is being pushed rapidly by Pasotex Pipe Line Co. between Wink and El Paso, Tex. The company is paralleling its existing 195-mile 8-in. crude line with another of the same size. When completed it will double throughput to El Paso refineries to 45,000 bbl. daily. Contract for the $3,500,000 project is held by McVean & Barlow, Odessa, Tex. Completion is scheduled in December. The line will deliver crude to three refineries in El Paso, owned by Standard Oil Co. of Texas, The Texas Co., and McNutt Oil & Refining Co. Four booster stations installed along the line in 1947 will be consolidated at a main station. Pasotex' original 8-in. carrier was laid in 1928.**

## Salt Lake to Extend Product Line 140 Miles to Spokane

SAN FRANCISCO.—Salt Lake Pipe Line Co. will begin work as soon as right-of-way clearances can be obtained and delivery of pipe is assured on a 140-mile, 8-in. extension of its product line to Pasco, Wash., from Pasco to Spokane.

Plans for the new line were revealed by T. S. Petersen, president of Standard Oil Co. of California, parent firm of Salt Lake Pipe Line, and C. E. Finney, Jr., president of Salt Lake.

Initial capacity of the line will be 12,000 bbl. daily. Estimated cost of construction, including a new pump station at Pasco, is $4,500,000.

Finney said construction will be completed and the line in operation by the middle of next year.

Products going into the line to Spokane will reach Pasco through a line completed to that city from Salt Lake City 2 years ago and by barge up the Columbia River.

## Northeastern's 515-Mile New England Gas Line in Service

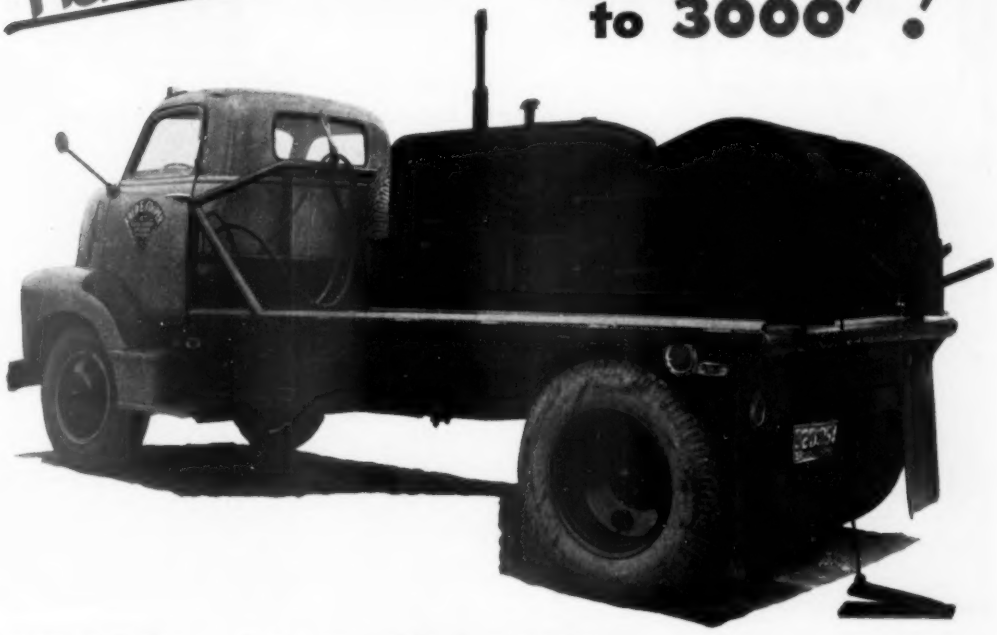
HOUSTON. — Northeastern Gas Transmission Co. has completed its 515-mile pipe-line system in Massachusetts, Connecticut, and New Hampshire and is delivering natural gas to all of the 35 New England gas-utility systems it has been authorized to serve by the Federal Power Commission.

Completion of the system was announced by Northeastern's president, Gardiner Symonds, who also is president of the company's parent firm, Tennessee Gas Transmission Co.

The natural gas now flowing into New England comes from 136 fields in the prolific Gulf Coast area of Texas and Louisiana, and is carried by Tennessee to the New York-Massachusetts line near Pittsfield, Mass.

Construction on the Northeastern system began in the spring of 1951. From its connecting point with Ten-

# Here's a better Winch for SERVICING to 3000'!



## COOPER—ALLIS-CHALMERS
## Model WD201 SKID WINCH

**The newly designed Model WD201 Well Servicing Unit features many improvements over the long popular and economical Model W201 Skid Winch.**

ENGINE—More horsepower. New head design for greater efficiency. Aluminum pistons. High compression. Roto-caps on valves that eliminate valve grinding.

TRANSMISSION—Heavy duty tractor type. Change gears and power shaft gears in one housing.

WINCH—Eight line speeds on winch drum. Maximum single line pull 22,400 lbs. Vacuum finger tip controls. Only 9' 5" overall length, will mount on short bed truck.

Available in Single and Double Drum models. Can be equipped with Rotary Drive, Jerkline Spudder, Cat heads and Telescoping Mast.

**A Cooper Sales Engineer will be glad to furnish more detailed information on this outstanding unit.**

Before you buy — see the Cooper —Allis-Chalmers line of modern well servicing and drilling equipment. Lower in first cost—Lower Maintenance cost—Better performance.

**FRED E. Cooper, Inc.**

**P. O. Box 1890 TULSA, OKLA.**

**Houston, Odessa, Los Angeles**

"Lining up a road section of 30" pipe line"

HOUSTON CONTRACTING COMPANY
General Contractors
OIL + GAS + GASOLINE + WATER PIPE LINES
LAURENCE H. FAVROT R. P. GREGORY GEO. A. PETERKIN
2707 FERNDALE PLACE HOUSTON 6, TEXAS

SAFETY-RELIEF VALVES and PRESSURE GAUGES by Lonergan

...A PIONEER...

There's a wide variety of Lonergan Valves and Gauges made for every oil field, refinery and pipe line application. Modern design—accurate construction. Extensively used for years throughout the industry. Send for our Valve Catalog 800-V and our Gauge Catalog 800-G.

J. E. LONERGAN CO.
• SINCE 1872 •
2ND and RACE STREETS
PHILA. 6, PA.
There's a Lonergan Distributor in your area.

nessee, the Northeastern line was laid eastward across Massachusetts. By September of 1951 the first natural gas was delivered to New England. Of the 515-mile total, 226 miles were built in 1952 and 289 miles in 1951. Steel required was 57,839 tons.

## Construction - Practices Group Fears Arbitrary Regulation

HOUSTON.—Growing concern over the possibility of arbitrary state regulation of gas pipe-line construction practice was expressed during a recent meeting here of a committee of some 60 industry representatives charged with drafting a new safety code for the American Standards Association.

The Houston meeting was the committee's third working session since it was set up in Chicago 3 months ago as a subcommittee under the A.S.A. B-31 committee on Code for Pressure Piping. Its next meeting will be held in New York City during the first week of December.

By early next spring, the committee hopes to have the safety code completed, accepted by the A.S.A. and the American Gas Association, and available to the industry.

One committee spokesman said that the pipe-line companies are not objecting particularly to mandatory laws enacted by the states to insure safe pipeline practice—except insofar as the separate states set up conflicting requirements. The companies intend to escape the dilemma of different restrictions in different states by drawing up a single safety code sponsored by the A.S.A. and universally accepted.

Still pending before Congress is a bill which would set up the Federal Power Commission as a policing agent to enforce compliance to some safety code. It is the business of the new subcommittee to write that code as a guide for state and federal regulatory authorities as well as the pipe-line companies.

## Expansion Approval Awaited

OKLAHOMA CITY.—Cities Service Gas Co. is awaiting Federal Power Commission approval of a $2,781,000 program to install 11,400-hp. in compressor units along its natural-gas-transmission system in Kansas.

The company proposes to install three 1,600-hp. units at its existing Greenburg station in Kiowa County and six 1,100-hp. units at a new station to be built in Harvey County.

New capacity would be used to help meet increasing peak-day demands along the company's transmission system.

5-MICRON FINISHED PETROLEUM PRODUCTS FILTERS

Fabricated in conformance with all JAN or MIL specifications for the removal of water and dirt down to 5 microns and smaller. Removal of this microscopic rouge lengthens the life of jet and gasoline aircraft engines, pumps, meters, valves, and fittings. Available in capacities from 10 to 2000 G. P. M. — for all finished petroleum products.

WARNER LEWIS COMPANY
P. O. BOX 3096 • TULSA, OKLA.

S. E. HUEY & CO.
ENGINEERS & SURVEYORS
HENINGER BLDG.
MONROE, LA.

SURVEYING & MAPPING

PIPE LINE SURVEYS

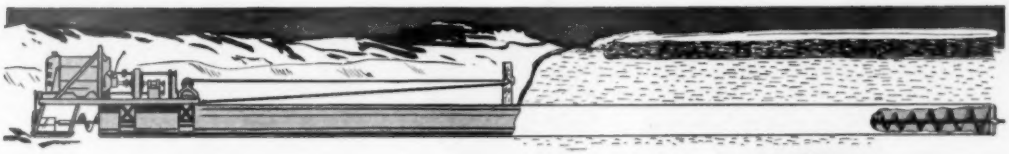
STEEL TURNBUCKLES

¾", ⅞", 1", 1¼" and 2" diameter carried in stock, in 6", 12", 18" and 24" length.

Black or Galvanized

Write or wire for prices and delivery.

NORRIS BROTHERS, INC.
Robinson, Illinois

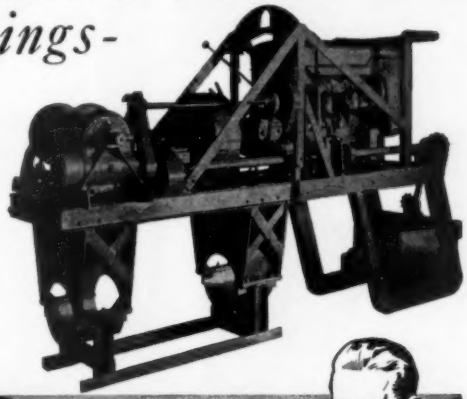


# *How to bore road crossings-*

**the fast, economical way!**

## *CROSE* AUGER TYPE ROAD BORING MACHINE

The fastest and most economical method of boring crossings where rock is not encountered. Installs casing as boring progresses — eliminates cave-ins. Absolutely prevents settling of concrete slab highways or railroad beds. Extremely accurate in alignment. Adaptable to all sizes of casing from 3" to 34".



**m. j. Crose**

SPECIALIZED EQUIPMENT FOR THE PIPELINE INDUSTRY

**MANUFACTURING COMPANY, INC.**

TULSA • HOUSTON • NEW YORK • SAN FRANCISCO

Save time and get quick efficient service on pipeline equipment.

**PHONE 6-2172 TULSA**

. . . this New

## WHIZ 20" Power Saw

**BUILT TO DO A BETTER JOB CUTTING TREES • FIREWOOD • BRUSH • WEEDS**

— for right-of-way crews, lease maintenance, location clearing, etc. Handles any Sawing or Trimming job up to 12". Mows 20". Index saw head permits cuts at four angles. Powered by a 2½ h.p. gasoline engine. Balanced for easy one-man operation.

*See your Supply Store first, or write for descriptive literature on ROOT Saws and Mowers.*

**Also available: 26" SAW with 5 h.p. gasoline engine.**

**ROOT MANUFACTURING CO., INC.**

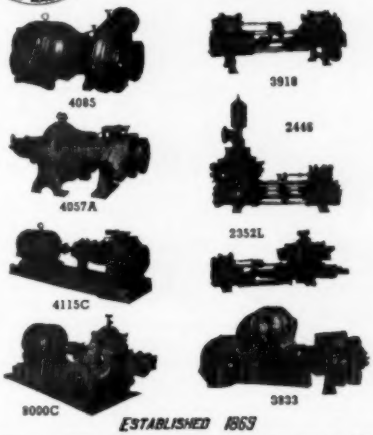
127 ELEVENTH ST., BAXTER SPRINGS, KANSAS

## PUMPS

**CENTRIFUGAL RECIPROCATING**

BUILDERS OF OUTSTANDING PUMPS

Since 1869




*ESTABLISHED 1869*

**DEAN BROTHERS PUMPS INC.**

INDIANAPOLIS IND.

323 W. TENTH ST.

the complete line of
GLOBE patented "2-Cutter" and "4-Cutter" ROCK BITS

*FIRST IN SERVICE EVERYWHERE*

Bigger cutters with larger bearing area feature the new, improved design of Globe "2-Cutter" and "4-Cutter" Rock Bits . . . cutters that *naturally* last longer, digging more hole, faster! In addition, they are free-running and maintain perfect alignment during the entire life of the bit. The Globe service organization is available at all times to help you select the drilling bit best suited to the conditions in your well. *For greater drilling economy, use Globe Drilling Bits.*

**GLOBE**
OIL TOOLS COMPANY
GLOBE OIL TOOLS
main office and plant: LOS NIETOS, CALIFORNIA

**branches in:** BAKERSFIELD and VENTURA, CALIFORNIA • CASPER, WYOMING • DALLAS, HOUSTON, ODESSA and TYLER, TEXAS • DUNCAN, OKLAHOMA • LAKE CHARLES, LOUISIANA

# Drilling Contractors

## Gregg Makes San Angelo West Texas Headquarters

Gregg Drilling Co., Houston, has opened district offices at San Angelo, Tex., from which the company's West Texas drilling operations will be conducted. A. L. Wehmeyer is superintendent in charge of the district. Previously operations in the area have been handled directly from the Houston headquarters.

The company has been working in Coleman and adjacent counties of West Texas for more than 6 years and has drilled more than 50 wells in the area. It currently has two rotary rigs and two pulling units assigned to the area. One rig temporarily is located in Zavala County, in Southwest Texas, but will be moved back to West Texas shortly. The other rig is running in Coleman County.

## New Cable Tool Contractor

Edico Drillers is a newly formed partnership engaging in cable tool contracting in southwestern Kansas and the Oklahoma Panhandle area. Operating headquarters are at Liberal, Kans., with H. E. Nuss, one of the partners, as manager and field superintendent. The new partnership is starting with a new Cardwell rig, capable of working at depths up to 7,000 ft.

## Rushing Adds New Rig

A. D. Rushing, Inc., Los Angeles drilling contractor, has acquired a new 7,000-ft. rotary rig. It now is on its first hole, which is being drilled for The Texas Co. in the Shiells Canyon field in Santa Clara Valley.

**Halko Drilling Co.,** Shawnee, Okla., is drilling a geological wildcat for Allied Materials Corp. in the East Sparks field, Lincoln County, Oklahoma. Location is in the SE NE NE 5-13n-5e, in the northwest part of the field, at 1-D Keegan.

**Smith Brothers Drilling Co.,** Shawnee, Okla., has a rig under contract to Helmerich & Payne, Inc., of Tulsa, and has moved in for a geological wildcat test located in the SE NW NW 17-17n-2e, southwestern Payne County, Oklahoma. The test is designated as 1 Scott.

**R. L. Manning Co.,** Denver, has a rig working for Warren Petroleum Corp. at a newly started wildcat test 15 miles northeast of Middlemist, Arapahoe County, Colorado. Location of the test, 1 Hart, is in the NW NW SW 34-4s-62w. This contractor also has a new wildcat under way for Shell Oil Co. at Little Beaver, 20 miles southeast of Baker, Fallon County, Montana. Location is in the C NE NW 24-4n-61e.

**Don Rounds** is the contractor on a wildcat test which Kewanee Oil Co. is starting in the NE NE SW 19-5s-55w, 28 miles east of Deertrail, Washington County, Colorado.

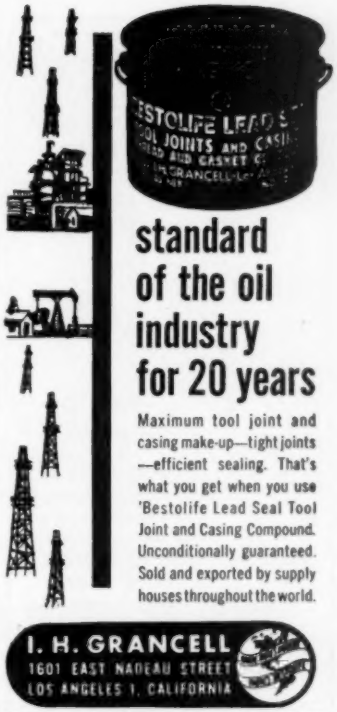
**Arrow Drilling Co.,** Dallas, is starting another well for Continental Oil Co. in the newly opened Redland field, 2 miles northwest of Redland, northern Bossier Parish, northern Louisiana. The new operation, 1 Stewart, the second for the area, is more than a half mile northwest of the discovery well, in 19-23n-12w, which found production around 7,800 ft.

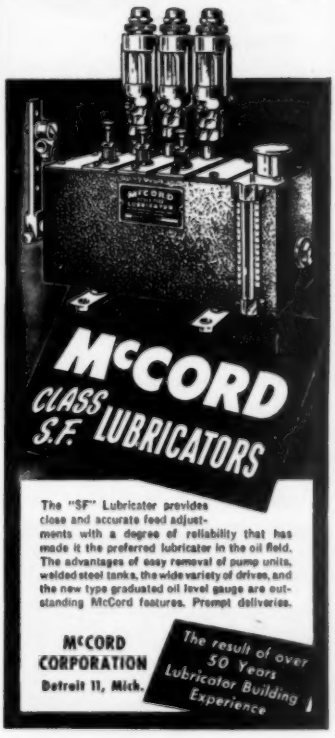
## Midwestern Drillers Tulsa

Midwestern Drillers, a partnership formed in 1944, is a pioneer drilling contracting organization in the southwestern Kansas and Oklahoma Panhandle region. Main office is located in the Wright Building, Tulsa. Operating headquarters are located at Liberal, Kans.

**Personnel:**—Principal owners in the partnership are J. C. Morrison, active manager and superintendent of operations at Liberal; Clyde Wyant and T. F. Hanson, who are associated with Midwestern Constructors, Tulsa. Willis Wyant, brother of Clyde, is office manager, located at Tulsa. Tool pushers are Cruce Dunnam and J. A. Hampton.

**Operations:**—The partnership has confined its activities largely to the southwestern Kansas counties of Meade and Seward and the Oklahoma Panhandle counties of Beaver, Texas and Cimarron where it has figured in the active exploration and development of deep gas-

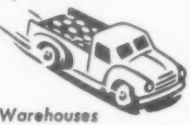

standard
of the oil
industry
for 20 years
Maximum tool joint and casing make-up—tight joints —efficient sealing. That's what you get when you use 'Bestolife Lead Seal Tool Joint and Casing Compound. Unconditionally guaranteed. Sold and exported by supply houses throughout the world.
I. H. GRANCELL
1601 EAST NADEAU STREET
LOS ANGELES 1, CALIFORNIA


McCORD
CLASS S.F. LUBRICATORS
The "SF" Lubricator provides close and accurate feed adjustments with a degree of reliability that has made it the preferred lubricator in the oil field. The advantages of easy removal of pump units, welded steel tanks, the wide variety of drives, and the new type graduated oil level gauge are outstanding McCord features. Prompt deliveries.
McCORD CORPORATION
Detroit 11, Mich.
The result of over 50 Years Lubricator Building Experience

Yes sir!

24 HOUR SERVICE on QUALITY Petroleum Products for the oil fields!

Just check this list of warehouses below and you'll see why we say — "WE'RE AS NEAR AS YOUR PHONE"! Call us collect and see!



*Branch Warehouses*

**TEXAS**
Odessa, Robert Lee, Snyder, Corpus Christi, Palestine and Winnsboro, Texas.

**LOUISIANA**
Houma, Eunice, Monroe, Ruston and New Orleans, La.

**MISSISSIPPI**
Brookhaven and Natchez, Miss.

**UTAH**
Vernal, Utah

**WYOMING**
Casper

**COLORADO**
Artesia, Colorado

**NEW MEXICO**
Lovington, New Mexico

**NORTH DAKOTA**
Williston, North Dakota

*Distributors of Quality Petroleum Products, including—*

**JIMMIE GRAY TOOL JOINT & DRILL COLLAR COMPOUNDS**

*Sold thru your Supply Store*

**PETROLEUM DISTRIBUTING COMPANY**

BOX 203 - HOUSTON, TEXAS - CHarter 8648

Quality Oil Field Lubricating Oils and Greases


distillate production off the flanks of the Hugoton gas area.

**Current Drilling:**—Three large rotary rigs are being operated under contract, although one, lately on an abandoned wildcat test drilled for Westhoma Oil Co. near Adams, in Texas County, Oklahoma, is temporarily inactive because of the pipe shortage. The other two, just moved from Meade County, Kansas, are under contract to Columbian Fuel Corp. for two wildcats being drilled in the Oklahoma Panhandle, one (1 Purdy) located in 20-6n-9eCM, northeastern Cimarron County; and the other (1 McNee) located in 10-4n-11e, on the west flank of the Hugoton gas area, in Texas County.

**Miscellaneous:**—The partnership has just completed a large, new concrete and steel warehouse and shop at Liberal, and provided a mobile radio communication system linking the Liberal headquarters with each of the tool pushers' cars.

**J. C. Morrison, partner and general superintendent**

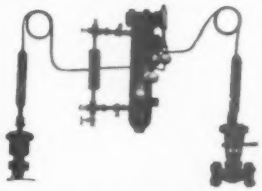
## ACTIVE ROTARY RIGS*

(United States and Western Canada)

| Area— | Week ended 10-13-52 | Change week ended 10-6-52 | Change week ended 10-15-51 |
|---|---|---|---|
| Gulf Coast | 554 | +20 | − 63 |
| N.&W. Tex.-N. Mex. | 752 | +11 | −254 |
| Ark.-N. La.-E. Tex. | 144 | + 4 | − 27 |
| Oklahoma | 314 | +13 | − 31 |
| Kans.-S. Neb. | 151 | −23 | − 38 |
| Illinois-Eastern | 155 | +10 | − 1 |
| Rocky Mtn. | 249 | − 6 | + 40 |
| Pacific Coast | 167 | + 1 | − 18 |
| Total U. S. | 2,486 | +30 | −392 |
| Western Canada | 181 | −17 | + 16 |
| Total | 2,667 | +13 | −376 |

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the North and West Texas-New Mexico and Oklahoma and Kansas areas are shown on pages 230 and 231.


**Like An Extra Employee!**



Yes, having an INFERNO Boiler Safety Unit is like having an extra employee on the job because it frees the fireman for other duties and provides a three-way safety precaution against accidents. Can't be beat for protection against explosions. Write for Bulletin 15-B for full details.

The INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

**Standco**
NO-SMOKE

**STANDCO BRAKE LINING**

Stands the gaff and gets the job done without scoring brake rims. See pages 3608-3613, Composite Catalog.

**Standco Brake Lining Co.**
HOUSTON

**SHURWAY**

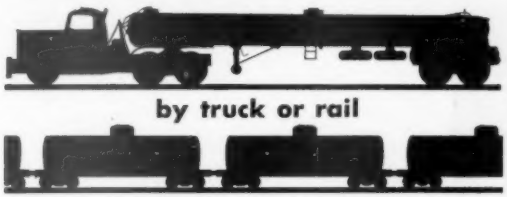
**SAFETY Load Binder Protects from Injury SAFEGUARDS LOADS**

**PROVED BY THE PETROLEUM AND ALLIED INDUSTRIES**

**NO DANGEROUS CHEATER . . . SHURWAY** eliminates hazard of broken chains . . . Load binding capacity exceeds safety margin . . . Quickly, safely operated . . . Proved in oil fields, trucking, lumber and other industries.

TULSA ENGINEERING *Sales Company*
Tulsa, Okla. 404 W. 1st. Tel. 3-2075

# FRONTIER delivers



by truck or rail

WHERE AND WHEN
**YOU** WANT IT

| | |
|---|---|
| * caustic soda (FLAKE, SOLID, LIQUID) | * chlorine |
| * muriatic acid | * oil well and industrial salt |

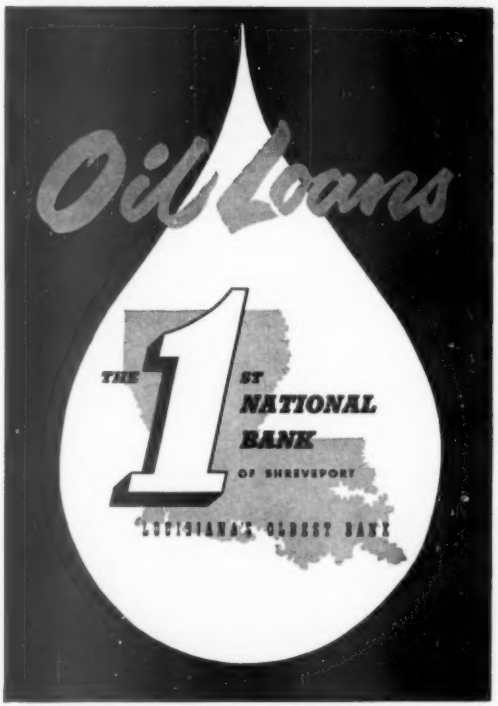
ANYWHERE IN THE ROCKY MOUNTAIN, MID-CONTINENT AND SOUTHWEST AREAS

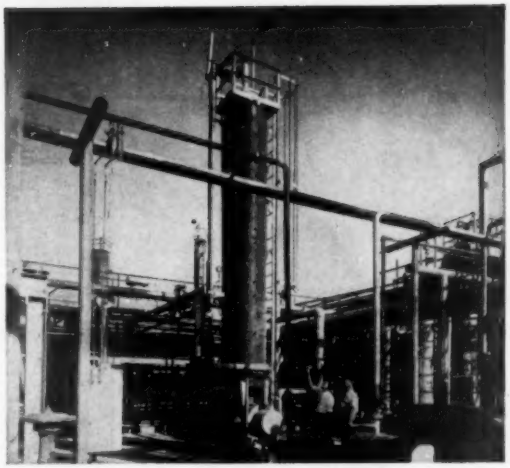
ELECTRO-CHEMICAL
Frontier Chemical Company
MANUFACTURERS

GENERAL OFFICES
321 WEST DOUGLAS
WICHITA, KANSAS
PHONE 7-5215

GEARED TO SERVE THE OIL INDUSTRY

Wichita, Kansas • Denver City, Texas • Midland, Texas • Denver, Colorado



# "We gain 3 days production cleaning towers on-line"

**THAT'S THE REPORT** from a Texas plant superintendent. His 45 foot absorber tower produces 120,000 gals a day. Cleaning it used to take 4 days, with a production loss of $26,800.

Not any more. Now he just pumps a powerful Oakite detergent solution through the tower and circulates for about 20 hours. He not only gets 3 days more production—he saves $695 on cleaning costs, and gets these other advantages besides:

- **No cutting-in, no dismantling of equipment**
- **Thorough cleaning, even in hard-to-get-at spots for optimum metal inspection**
- **A minimum of abrading—critical dimensions remain unchanged**
- **Maintenance crew released for other work while solution circulates**

**TRY IT YOURSELF.** Ask your local Oakite Technical Service Representative. Or write Oakite Products, Inc., 44C Rector St., New York 6, N. Y.

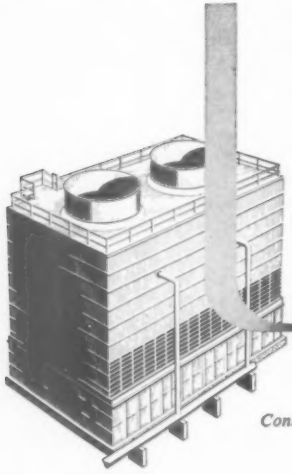
*Technical Service Representatives in Principal Cities of U. S. & Canada*

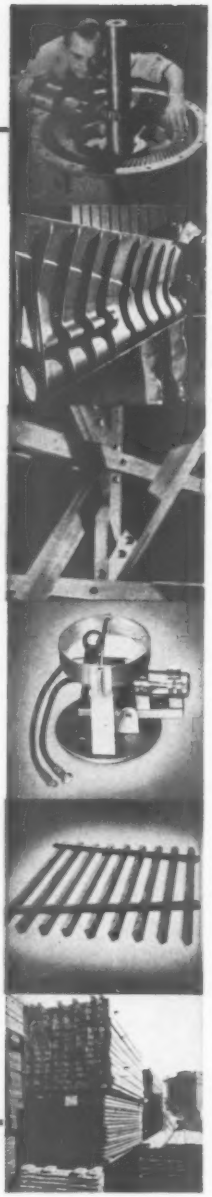
# OAKITE

**PETROLEUM SERVICE DIVISION**

# ONLY FLUOR

*induced draft counterflo cooling towers provide these 6 exclusive features...*





## *Spiral Bevel Gear Speed Reducers*

Only Fluor-Western speed reducers incorporate curved tooth spiral bevel gears as standard design. This proven principle provides quieter, smoother, more efficient operation under the rugged conditions of cooling tower service. Other special design features include: oil-bath lubrication; dry air breather; chrome-plated shaft at oil seals; and, low-speed fan shaft mounted on special steep angle thrust and radial bearings to take combined gear thrust, fan thrust, and weight of fan assembly.

## *Unique Fan Blade Design*

The Fluor Type HC Stainless Steel Fan blades, furnished as standard on every Fluor Counterflo Cooling Tower, are a joint development of The Fluor Corporation and Solar Aircraft Company. Designed specifically for induced draft cooling tower service, their unique air foil handles maximum air volumes at minimum tip speeds and horsepower requirements. Design *plus* mechanical arrangement eliminates recirculation of air and resulting power-consuming turbulence.

## *Internal Gusset Plate Construction*

Fluor Counterflo Cooling Towers alone make full use of tensile as well as compressive strength of structural members! Their internal gusset plate design duplicates that used in wooden bridge construction. These simple, yet extremely strong joint connectors mean longer tower life, lower total tower weight, fewer and simpler castings, greater ease of erection, and minimum spoilage should the structure be dismantled, moved and re-erected.

## *Patented Vibration Cut-Out Switch*

The Vibration Cut-Out Switch developed and patented by Fluor in 1944 protects tower structure and mechanical equipment by stopping the motor should excessive vibration suddenly occur. In addition to its value as an emergency safety device, the switch can be utilized by the operator as a positive "on-off" switch during routine inspection of tower structure and mechanical equipment. The motor cannot be started accidentally once the switch is placed in the "off" position.

## *Sloping-Bar Grid Decking*

Exclusive Fluor-designed sloping-bar grid decks are of rough-finished 1" select redwood machine-nailed to 1" x 2" cleats—strong enough for use as scaffolding during erection, rugged enough to withstand the erosion of falling water. This means low maintenance and replacement cost. The sloping-bar design and arrangement of each deck cross member combines the advantages of maximum deck surface with minimum air pressure drop through tower.

## *Complete Prefabrication of Structure*

Only Fluor Counterflo Cooling Towers are completely prefabricated. This offers many advantages to the operator. Tower parts are "packaged" for rapid delivery, marked for orderly erection. Erection is faster, easier, at lower cost. All cutting, drilling and nailing is completed at the factory. Prefabrication means standardization—low-cost replacement of standard parts that may become damaged over the years. It means uniformity in both performance and appearance.

*Contact your nearest Fluor representative for detailed information. You Can Be Sure With Fluor*

**FLUOR**

*Engineers - Constructors - Manufacturers*

THE FLUOR CORPORATION, LTD. · LOS ANGELES · HOUSTON
New York, Chicago, Pittsburgh, Boston, Tulsa, San Francisco, Birmingham and Calgary

Represented in the Sterling areas by:
Head Wrightson Processes Ltd., Teesdale House, Baltic Street, London, E.C.1, England

# REFINING

## Cat Dedicated

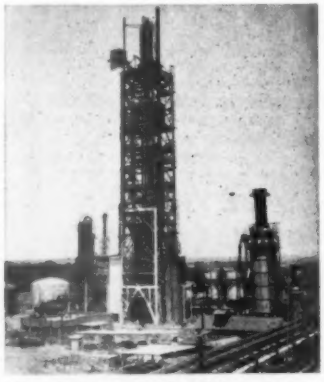
### Phillips unveils new T.C.C. unit at Okmulgee refinery

PHILLIPS PETROLEUM CO. dedicated a new T.C.C. air-lift catalytic cracking unit at its Okmulgee, Okla., refinery October 14 to coincide with Oil Progress Week. Paul Endacott, president of Phillips, was principal speaker at the dedication ceremony, which also featured an open house.

The ceremony marked completion of the Okmulgee expansion and modernization program. The new facilities include: (1) The cat cracker of nominal 8,000 bbl. per day capacity, (2) a feed-preparation unit consisting of fired preheater, flash drum, and vacuum still, and (3) a gas-concentration unit.

Two new 55,000-bbl. floating-roof tanks were installed. These, together with an existing storage tank, will store products to be moved by Great Lakes Pipe Line Co. A connection is to be made with Great Lakes so that products can be moved by existing Phillips lines to other Midwest marketing points. A new laboratory building also was completed to handle control tests and analytical work.

**Processing scheme . . .** Previous Okmulgee processing was based on crude distillation and thermal cracking. The distillation operation produced a conventional line of products including solvent naphtha, S.R. gasoline, kerosine, and light and heavy gas oils. Heavy gas oil and topped crude were cracked separately in the Dubbs unit.



**NEWLY DEDICATED Phillips cracker is one of the few which employs an S.R. (sulfur resistant) extruded type of catalyst.**

In the present operation, no separation is made of the heavy gas-oil fraction. A topped crude of wide boiling range results. This amounts to about 50 per cent of crude and constitutes the charge to the feed-preparation unit. Following heating, this material is flashed. Flash-drum overhead is charged as vapor feed to the cat cracker, while bottoms are processed in the vacuum still. A clean vacuum gas oil is produced that goes to the cat cracker as liquid feed. Vacuum bottoms are at present undergoing visbreaking in the Dubbs unit.

The cat cracker is of stacked-up T.C.C. design consisting of lift pot, kiln, reactor, hot storage bin, and separator surge tank. An airlift is employed to move catalyst from the lift pot to the surge separator from which it goes to the reactor. A moving solid bed is employed.

The cat is licensed by Socony-Vacuum. General contractor on the job was Fluor Corp., Ltd. Construction was under supervision of Phillips engineers assigned from the Bartlesville offices. G. F. L. Bishop is superintendent of the refinery.

## Capacity of Frontier Cat To Be Boosted 3,900 Bbl.

CHEYENNE, Wyo. — Frontier Refining Co. will start work within the next few months to boost design capacity of an existing catalytic cracking unit from the present 2,600 bbl. to 6,500 bbl. daily.

Work involves conversion of the present air compressor to a gas compressor, installation of two 300-psi. steam generators, a new blower, new regenerator grid, new cyclone for the generator, and additional condensing equipment.

Cost of the expansion is estimated at $717,000—65 per cent of it approved for accelerated amortization by the Government.

One of the new steam generators will generate steam for waste heat on the flue gas outlet. It will replace a 40-psi. unit. The other will replace a 150-psi. unit on the fractionator slurry bottoms.

Universal Oil Products Co. will handle design and engineering work.

The company also is planning to begin manufacture of L.P.G. by installing light-ends separation equipment at the polymerization unit and high-pressure storage and loading equipment. Present plans provide for recovering propane

A MUST FOR EVERY VALVE BUYER

Slashes time spent on valve specifying and checking. Compares valves of 19 leading manufacturers. Over 50,000 postings in its 170 loose-leaf pages! Used by major companies throughout U.S.A.

SPECIAL OFFER—New, revised edition just out. Price $25. Offered at $21.50 postpaid for *limited time* ($22.50 outside U.S.A.). Every specifying engineer, every purchasing agent should have this manual. Like adding an extra man to your staff. We send on approval. Write NOW for full information.

EQUIVALENT VALVES COMPANY
Suite 500
115 West 7th St. Los Angeles 14, Calif.

IRON SPONGE

*for high efficiency gas purification at high pressures*

Iron Sponge is your key to sulfur-free gas at minimum processing cost. Iron Sponge has high efficiency at low pressures or at today's high pressures and high temperatures. It absorbs *more* $H_2S$, gives long service between foulings, and is easily regenerated. Investigate it for your purification problem today!

CONNELLY Inc.

3154 S. California Ave., Chicago 8, Ill.
Elizabeth, N. J. • Los Angeles, Calif.

3 to 5 times Longer Life
for Your Lubricated
PLUG VALVES
BY LUBRICATING THEM
Automatically!
EVERY TIME...

. . . they're OPENED and CLOSED
DELTA Automatic
Plug Valve LUBRICATOR
This simple, fool-proof low priced device forces a measured amount of lubricant into the valve *automatically* each time it is opened and closed. Ideal for those frequently used valves on:
LOADING RACKS
MANIFOLDS
LPG SYSTEMS
Valve may be opened and closed as many as 90 times before refilling reservoir. Let us show *you* how it will cut *your* costs.
10 TIMES FASTER LUBRICATION

With the DELTA High Pressure Gun, DELTA Fittings and DESCO Specialized Lubricants . . .
. . . you can lubricate 10 to 15 valves in the time usually required to service one with conventional jack screw.
The Only Complete Plug Valve Lubrication Company
DELTA-DESCO SYSTEM
DELTA
ENGINEERING SALES CO.
806 Louisiana Ave. • Phone 3-2416
SHREVEPORT, LOUISIANA, U.S.A.
Sales Offices In All Principal Cities

and blending butane back into gasoline. Estimated recovery of L.P.G. is 2,000,000 gal.

The Frontier plant now has a crude-charge capacity of 9,700 bbl. daily. Thermal operations total 4,000 bbl. daily. Polymer-production capacity is 250 bbl. daily.

## Farmers Union Completes Laurel Refinery Expansion

LAUREL, Mont. — Completion of the $4,500,000 expansion of the Farmers Union Central Exchange refinery here will be observed officially at dedication ceremonies here October 21.

New units include a 5,000-bbl. fluid catalytic cracker, a crude heater, a vacuum unit, a two-stage gas-concentration unit, and a solid phosphoric acid polymerization unit.

The new units, together with revamping work on the entire refinery to fit it for the new production pattern, will boost crude-charge capacity to 12,500 bbl. daily. Construction was completed in about 14 months.

Catalytic operations of the plant total 5,000 bbl.; thermal operations total 6,000 bbl. daily, including polymer production capacity of 350 bbl. daily.

The refinery has been operated by Farmers Union Central Exchange since 1943.

## Wilcox Placing Platformer On Stream at Bristow, Okla.

BRISTOW, Okla.—Wilcox Oil Co. has completed testing of its recently completed 1,500-bbl. Platforming unit at its refinery here and has placed it on stream.

Frank H. Dunn, president of the company, said the new unit cost about $1,000,000.

The Bristow plant has a crude-charge capacity of 5,500 bbl. daily and a thermal capacity of 2,250 bbl. daily.

## Shell Chemical Completes New Sulfur-Recovery Unit

HOUSTON.—Shell Chemical Corp. has placed on stream a sulfur-recovery unit adjacent to the Shell Oil refinery here which will recover 55 tons of elemental sulfur daily from waste refinery gases.

The unit, constructed by Ralph M. Parsons Co., Los Angeles, will recover hydrogen sulfide from waste gases of the refinery and catalytically convert the acid gas to 99½ per cent pure sulfur.

Construction of the plant was begun during last year's critical sulfur shortage.

Business and Pleasure in TULSA means-

THE MAYO
★ CENTRALLY LOCATED
★ AIR CONDITIONED
★ COFFEE SHOP

OIL and GAS BURNING EQUIPMENT
for
PETROLEUM REFINERIES
Detailed Information Gladly Sent Upon Request
CHEMICAL-PETROLEUM DIV.
NATIONAL AIROIL BURNER COMPANY, INC.
1238 E. SEDGLEY AVE., PHILADELPHIA 34, PA.
Southwestern Division: 2512 So. Blvd., Houston 6, Tex.

See Composite and Refinery Catalogs, or Write for Folder on
FLEET-LINE
PIPE SADDLES
Nozzle sizes from ¼" to 24"

ASTM A234
STEEL FORGINGS, Inc.
P. O. BOX 276-B SHREVEPORT, LA

# NATURAL GAS

## Old "25 Per Cent" Allowable In Texas May Be Discarded

AUSTIN.—Texas' outdated 19-year-old regulation restricting production of gas wells to 25 per cent of their potentials may go by the boards soon.

The Texas Railroad Commission will consider abolishing the rule at a hearing here October 23.

The rule as now written, according to a commission engineer, appears to penalize small gas wells. It also has lost considerable of its effectiveness because the commission has been granting a growing number of exceptions. All of the 250 applications for exceptions received during the past 6 months have been approved, he said.

In place of the 25 per cent regulations, the commission proposes to substitute a clause providing that allowables from a common source of supply be set to conform with the seasonal market demand which can be produced without waste and then distributed among individual producers on a reasonable basis.

The hearing will also consider revision or amendment of a rule for determining gas-well potentials. Instead of the present requirement for operators to run flow tests through four choke sizes, only one test would be necessary under the amended regulation.

## Eight Firms Propose Rate Hike Totaling $17,700,000

WASHINGTON.—Applications for wholesale natural-gas rate increases totaling more than $17,700,000 have been filed by 8 natural-gas companies with the Federal Power Commission.

The companies and the amounts of the proposed increases are: Transcontiental Gas Pipe Line Corp., Houston, $9,800,000; United Gas Pipe Line Co., Shreveport, $131,200; Natural Gas Pipeline Co. of America, Chicago, $3,500,000; Northern Natural Gas Co., Omaha, $2,998,147; Colorado Interstate Gas Co., Colorado Springs, Colo., $375,200; South Jersey Gas Co., Newark, N. J., $57,000; Tennessee Natural Gas Lines, Inc., Nashville, $388,000; and East Tennessee Natural Gas Co., Knoxville, $486,000.

Transco said its increase is necessary largely because of the exhaustion of nonrecurring tax credits for federal income-tax purposes.

Northern's application was a refiling of a previous proposal for a $10,600,000 increase of which $7,601,853 was disallowed.

Natural Gas Pipeline's filing was based on increased costs of purchased gas.

Applications filed by United Gas Pipe Line, Tennessee Natural Gas, and East Tennessee Natural Gas were based principally on an intended increase in rates to them by their supplier, Tennessee Gas Transmission Co., Houston.

Colorado Interstate is seeking higher rates on grounds that certain of its present rates lack $360,661 annually of meeting cost of service.

South Jersey's application was filed after its supplier, Transco, submitted its proposal for a rate hike.

## Revised Gas-Sales Pact to Boost Chicago Corp. Revenue

CHICAGO.—The Chicago Corp. has negotiated a revised contract with Tennessee Gas Transmission Corp. for sale of natural gas which will increase its gross annual revenue by about $1,350,000.

The revised contract, one of two major agreements with Tennessee, provides for an increase in price to 10 cents per M.c.f. at a pressure base of 14.65 psi., less a small charge for dehydration. Additional reserves are pledged to Tennessee and daily deliveries to that company will be increased.

Escalation clauses, also revised, provide for an increase of 1 cent per M.c.f. at the end of each 5 years until the termination of the contract. Tennessee is further obligated to increase its purchase price to Chicago to the highest price it pays at any time under contract for 20,000,000 cu. ft. of gas daily, or more in Texas Railroad Commission Districts 2 and 4.

The old contract provided for a price of 6 cents per M.c.f. at a 16.7 psi. pressure base until November 1954. The price then would have been hiked to 7 cents per M.c.f. until November 1959 when the price would have been adjusted by negotiation.

## August Sales Up 4½ Per Cent

NEW YORK.—Sales of natural gas to ultimate consumers in August gained almost 4½ per cent over those in August 1951, totaling more than 3,152 million therms, the American Gas Association reported last week.

For the 12 months ended August 31, sales totaled 46,746 million therms—up 8.8 per cent over those during a same period a year earlier.

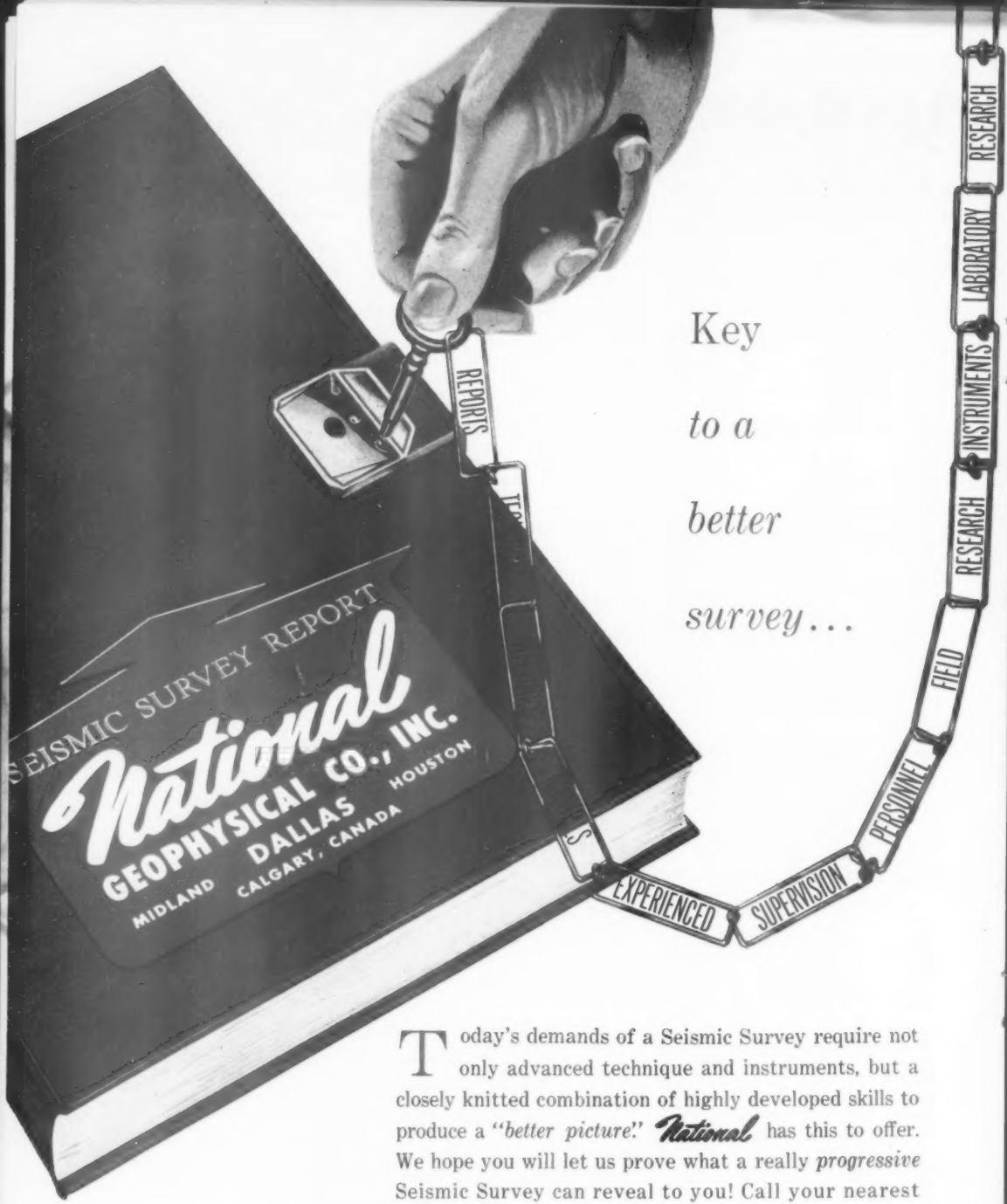
The A.G.A. index of natural-gas sales was 354.5 per cent of the 1935-39 average in August.

## Merger Approved by FPC

WASHINGTON.—Rockland Light & Power Co., Nyack, N. Y., has received final approval of the Federal Power Commission to acquire and operate all natural-gas properties owned by Rockland Gas Co., Inc., Spring Valley, N. Y. Payment for the properties, which include 249 miles of gas lines, will be equivalent to $1,220,000.

## Concentrating Operations

**Southern Counties Gas Co. of California has completed and is now occupying a new four-story office building on its 13-acre Triggs Street tract in eastern Los Angeles. The $700,000 building is occupied by the engineering, accounting, personnel, claims, home-service, and customer-service departments. The base also accommodates the purchases and stores department, general meter shop, general repair shop, central offices and garages of the transportation department, and a 4-acre pipe yard with facilities for coating and wrapping pipe.**




Key

*to a*

*better*

*survey...*

Today's demands of a Seismic Survey require not only advanced technique and instruments, but a closely knitted combination of highly developed skills to produce a *"better picture."* *National* has this to offer. We hope you will let us prove what a really *progressive* Seismic Survey can reveal to you! Call your nearest *National* service office or DIxon 2671, Dallas, Texas.

LEADING THE FIELD OF SEISMIC EXPLORATION

# Oil-Finding Fable

ONCE upon a time (about 1938) there lived an oil-company seismologist named Jack.* Jack was assigned the job of surveying a 400-sq.-mile block in excellent reflection country.

Jack detailed the area with continuous profiles. He did his work precisely and thoroughly. The over-all velocity applied to the single reflecting horizon he mapped was obtained from a reliable survey of a deep dry hole in the block. After about a year's work, Jack had a contoured-in-feet seismograph map of the area. This map showed five plus or minus 640-acre "highs." He easily sold his management on drilling them.

The first well came in a producer within just a few feet of where Jack said it would. The second well was dry and the potential pay sand was found several hundred feet lower than expected—the latter, Jack said, was because the hole was crooked. The third well made a producer, but the pay was found several hundred feet higher than anticipated; Jack was baffled. The fourth and fifth wells were dry. They checked low to Jack's map and surveys showed straight holes.

Our hero was annoyed no little bit. He began to wonder why his map wasn't right and applied a great deal of effort to determining where he was wrong. While working his records for miscorrelation, another company brought in what developed into a structurally high, 2,000-acre pool on acreage Jack had mapped as regional dip—acreage he had convinced his company to release. Jack sneaked in and out of his office with determination to find out what was wrong with his survey.

Jack read some papers which pointed out how velocity variations could distort data to such a degree that a structure might be hidden; or, maybe, a structure indicated where there was none. That was it!—he needed better velocity control. On surveying seven wells in the block he was amazed at the great differences in velocity he obtained. On applying the new velocities he "discovered" (2 years too late) the big field found by a competitor. He also eliminated one of his dry highs; but, two dry highs remained.

Then one day, due to unavoidable circumstances, Jack found himself with the geologist of his company who was working the area of the surveyed block. Much to the astonishment of each, it developed that the other might not be completely off his rocker. Jack found that the geologist might have a few ideas—nothing really worth while, of course. But, as time passed, the incoherent mutterings of the geologist kept coming up in his thoughts: rapid facies changes throughout the area; thickening, thinning, and wedging out of beds, first in one direction and then another; folding and fracturing, perhaps faulting and overthrusting. It could be that these things might radically change the over-all average velocity of sound waves in even short distances. Obviously he didn't have enough velocity surveys. How many would it take?

Jack began spending more and more time with the geologist. It became obvious to Jack that over-all velocity variations could be attributed to thickening and thinning of formational units as well as facies changes—that his velocity contours would change with every additional velocity survey. He was soon convinced that the variations in the rocks could never be worked into an all-inclusive formula; but, by studying the geologic knowledge already at hand he could anticipate such changes and refine his picture without the aid of innumerable velocity surveys.

Meanwhile, the geologist began to realize that Jack didn't think geophysics had all of the answers. After that it wasn't long before Jack and his newly found friend had a well going which was to open a 4,000-acre field smack in the middle of that old block.

The seismologist and the geologist worked profitably together ever after.

*Philip C. Ingalls.*

See news section of this issue for report on the Geophysical Society of Tulsa's panel discussion on the need for velocity surveys.

*Any resemblance to any seismologist, living or dead, is purely coincidental.

## HIGHLIGHTS OF WEEK'S DEVELOPMENTS

**MANITOBA** . . . Bailey Selburn Oil & Gas, Ltd., has indications of a new oil strike from the Mississippian in the Hargrave area, 6 miles north of Virden pool, at Baysel-California Standard Co. 2-21 Hargrave on LSD 2 21-11-27w1. On initial drill-stem test at about 2,200 ft. the well yielded 90 ft. of gas-cut oil and 60 ft. of clean oil.

**WEST TEXAS** . . . The importance of northeast Andrews County received a further boost as Phillips Petroleum Co. 1-CC University established good flowing production in the Ellenburger. The wildcat had recovered oil from the Wolfcamp and had flowing oil in the Devonian, which will remain cased off until the Ellenburger is depleted.

**NORTH DAKOTA** . . . Deep Rock Oil Corp. has cored shows and recovered slightly oil-cut mud on tests below the top of the Charles at 1 Brusich, SE SE SE 8-135n-98w, Slope County wildcat, for the first reported shows of this type anywhere in the state outside the Nesson anticline area.

**MONTANA** . . . The Texas Co. has completed the confirmation well for the apparent new field in the highly active Northwest Sumatra area, Rosebud County, for an initial potential of 224 bbl. of oil daily from the Amsden. Potentials in the area promise to be higher than the other producing areas in this part of the state.

# Louisiana-Ark.

## Muddy Bayou Discovery Finaled in LaSalle

SHREVEPORT.—Hunt Oil Co. and associates have completed a new discovery from Wilcox perforations at 5,195-99 ft. at 73 Louisiana Delta, C SW NE 23-5n-4e, 4½ miles northwest of North Saline Lake field, LaSalle Parish. East Central Louisiana. The discovery flowed 111 bbl. of 45°-gravity oil per day. The total depth was 6,006 ft. Hunt and associates have staked location for first confirmation try ½ mile west of the discovery which is about ¾ mile east of Muddy Bayou.

Hunt and Gulf Refining Co. are preparing to squeeze initial perforations at their Catahoula Parish wildcat, 70 Louisiana Delta, C SE SW 32-4n-5e, 2 miles southwest of Mitten Lakes field in the southern part of the parish.

Gas was at the surface in 4 minutes, and oil, mud and water flowed in 14 minutes on a drill-stem test of perforations at 6,510-14 ft. Salt water entered and cut the flow up to 60 per cent during the last part of the test. Operators will reperforate at about the same interval.

**Arkansas.**—McAlester Fuel Co. has cemented production casing at 2,635 ft. and will make production tests at 1-A H. D. Pendleton, C SE SW NE 24-18s-15w, ½ mile northwest of Hibank field, Union County. Bottom of the hole is in the Travis Peak at 3,555 ft. Production was indicated in both the Meakin and Graves sand intervals on drill-stem tests at the wildcat.

**LOUISIANA SUCCESSFUL WILDCATS**

Bossier Parish: Carter Oil Co. 1 Crystal O & R Co., 760 ft. S and 810 ft. E NWc SW NE 33-21n-11w, flowed 238 bbl. of oil from Cotton Valley 9,706-20 ft., TD 9,817 ft. (opens Ivan pool).

La Salle Parish: Hunt Oil Co. and Gulf Refining Co. 73 Louisiana Delta Lumber Co., C SW NE 23-5n-6e, flowed 111 bbl. of oil from Wilcox 5,195-99 ft., TD 6,006 ft. (tentatively named Long Slough pool).

**LOUISIANA WILDCAT FAILURES**

Concordia Parish: Barnett Serio et al 1 Quinn, C SE SE 18-4n-7e, dry, TD 7,509 ft.

Franklin Parish: Chicago Mill and Lumber Co. 1 Rupert Scott, 467 ft., S and W of NEc 16-11n-9e, dry, TD 3,080 ft.

Ouachita Parish: Monla Gas Co. et al 1 Clanton, 1,650 ft. N and 660 ft. W SEc SW 1-18n-2e, dry, TD 9,512 ft.

Sabine Parish: Tabert & Harper 1 Sanders, 1,840 ft. S and 1,667 ft. E of NWc 33-10n-11w, dry, TD 3,449 ft.

Carter Oil Co. 1 4 L Co. "Co.," 150 ft. N and 691 ft. E SWc NW SE 32-7n-12w, dry, TD 3,189 ft.

Carter Oil Co. 1 Louisiana Longleaf Lumber Co. "B," CSW NW 19-6n-11w, dry, TD 5,002 ft.

Union Parish: Barnwell Drilling Co. 1 W. L. Farr Est., C SE SE NW 14-23n-2e, dry, TD 2,565 ft.

**ARKANSAS WILDCAT FAILURES**

Columbia County: Shell Oil Co. 1 Browning-Burns Unit, 660 ft. N and W SEc 12-20s-23w, dry, TD 12,648 ft.

Lafayette County: The California Co. 1 Fitzgerald, 150 S and 50 ft. E of C SW NE 27-16s-23w, dry, TD 8,125 ft.

Miller County: Jay Simmons 2 Dildy, 50 ft. SE Cen. S½ NW NW 21-17s-27w, dry, TD 4,675 ft.

Union County: Kinard 1 Hartje, 330 ft. S and E NWc SE NW 17-16s-14w, dry, TD 3,522 ft.

**MISSOURI SUCCESSFUL WILDCAT**

Clinton County: Fell et al 2 Harper, C NE SW 28-56n-30w, 1,540 M.c.f. of gas from Squirrel sand 386-405 ft., TD 405 ft.

**MISSOURI WILDCAT FAILURE**

Dekalb County: Chenault et al 1 Glen Dice, C NE NE SE 2-58n-30w, dry, TD 807 ft. in Pennsylvanian.

# North-Central Texas

## Callahan Wildcat Drills Ahead After Good Shows

WICHITA FALLS.—Cities Service Oil Co. 1 Johnson, Callahan County wildcat 1½ miles southeast of Oplin, developed some gas and 180 ft. of gas-cut mud on drill-stem test from 3,447-65 ft.; and at 3,658-80 ft. recovery was 225 ft. of oil plus 180 ft. of heavily oil and gas-cut mud. Last reported test from 3,884-94 ft. recovered 90 ft. of gas and 15 ft. of slightly oil and gas-cut mud. Drilling continued below 4,041 ft. in shale.

Callahan County gained a 4,200-ft. operation as R. W. Brown 1 E. W. Riggs, Block 217, Victoria CSL Survey, 7 miles northwest of Cross Plains.

A new oil pay in the conglomerate was in prospect at Jack Grace 1 McCall, Section 15, ETRR Survey, 2 miles southeast of Nocona. Drill-stem test from 5,897-5,905 ft. had flowing oil, by heads, in 42 minutes and a steady flow in 58 minutes. No estimate was made on the rate of flow. Recovery was a pipe full of oil, with no water. Location is a 330-ft. east offset to George Engle 1 McCall, which recovered oil on drill-stem test in the conglomerate at 5,906-21 ft. but which was abandoned because of water.

Jack Grace 1 Ray, wildcat 3 miles southwest of Stoneburg in Section 27, Jack CSL Survey, recovered 365 ft. of oil and 5 ft. of heavily oil-cut mud on a 12-minute drill-stem test in conglomerate at 6,017-33 ft. Oil reached the surface in 8 minutes. Drilling continued below 6,104 ft. in shale.

Warren Petroleum Corp. 1 Jones, wildcat 3 miles north of Bryson, Jack County, recovered 10 ft. of drilling mud on a 2-hour test of the Bend conglomerate at 4,793-4,806 ft. Drilling continued below 4,866 ft.

**NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS**

Archer County: R. L. Lusk Jr. 1 F. C. Green, J. Levins Sur., A-259, TD 1,142 ft., elev. 1,200 ft., pay 1,137 ft., IP pumped 15.7 bbl. oil.

Callahan County: George Callihan 1 I. H. Box, Sec. 9, Anthony Bates Sur., TD 3,306 ft., elev. 1,787 ft., Palo Pinto pay 3,284 ft., IP 247 bbl. 42°-gravity oil, 12/64-in. choke, TP 400 psi., GOR 600 cu. ft.

Coleman County: Richardson and Maxwell 2 Helm, Sec. 9, T&NO, TD 1,985 ft., pay 1,978 ft., IP 30 bbl. 42°-gravity oil, 32/64-in. choke, TP 80 psi., GOR 1,000 cu. ft.

Grayson County: Cox Drilling Co. 1 Bailey-Talley Unit, M. K. Snell Sur., A-1132, TD 5,995 ft., elev. 629 ft., pay 5,297 ft., IP pumped 110 bbl. 41°-gravity oil, GOR 350 cu. ft.

Jack County: S. D. Johnson 1 J. E. Garrett, M. Putnam Sur., A-465, TD 3,204 ft., elev. 1,008 ft., pay 3,200 ft., IP 94 bbl. 39°-gravity oil, 12/64-in. choke, TP 60 psi.

Jones County: Onyx Oil Co. 1 W. D. Bristow, 1-2-J. H. Gibson Sur., TD 3,406 ft., pay 3,064 ft., IP pumped 124 bbl. 39°-gravity oil.

Montague County: George S. Engle 1 Wilson, W. R. Gaston Sur., TD 5,962 ft., elev. 889 ft., conglomerate pay 5,824 ft., IP pumped 108 bbl. 28°-gravity oil, GOR 200 cu. ft.

Stephens County: Woodson Oil Co. 1-B Robert Brown, 114-6-BBB&C, TD 4,238 ft., elev. 1,095 ft., Mississippian pay 4,228 ft., IP 233 bbl. 42°-gravity oil in 15 hours, 16/64-in. choke, TP 625 psi., GOR 750 cu. ft.

Wilbarger County: O. B. Kiel Jr. 1 W. T. Waggoner, 36-6-H&TC, TD 1,805 ft., elev. 1,101 ft., pay 1,798 ft., IP pumped 194 bbl. 37°-gravity oil.

John and Pat O'Neil 2-P Waggoner, 1-13-H&TC, TD 1,932 ft., pay 1,938 ft., IP pumped 15.5 bbl. 36°-gravity oil.

F. J. Pounds 1-D Pounds-Waggoner, 109-14-H&TC, TD 1,650 ft., elev. 1,242 ft., pay 1,286 ft., IP pumped 28.8 bbl. 32°-gravity oil.

**NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES**

Archer County: Archer Drilling & Producing Co. 1 E. E. Kunkel, Blk. 13, Meads Subd., Wm. Ainsworth Sur., dry, TD 1,275 ft.

Bolin Oil Co. 4 Virgil Seal, Blk. 110, J. W. Harris Subd., Club Ranch Sur., dry, TD 3,854 ft.

Butts & Calvin 1 Campbell Est., Blk. 1,812, TE&L Sur., dry, TD 1,092 ft.

Cosden Petroleum Corp. 3-B Parkey, N. J. Jose Sur., A-737, dry, TD 5,367 ft.

Fair, Timberlake & Scott 1 G. T. Taylor, Blk. 139, J. W. Harris Sur., dry, TD 1,404 ft.

Pete Hall Drilling Co. 1 S. Abercrombie, S. Abercrombie Sur., A-752, dry, TD 1,340 ft.

Miami Operating Co. 1 F. J. Schroeder, 27-4-Clark & Plumb, dry, 5,149 ft.

Miller & Banks 1 Wayne B. Ray, Blk. 3, John F. Harris Subd., dry, TD 1,542 ft.

Baylor County: Hamilton Oil Co. 1 A. J. Kulhanek, Sec. 3,427, TE&L Sur., dry, TD 1,580 ft.

Callahan County: Wm. B. Wood 1 Adelia C. Scott, Sec. 207, Mial Scurlock Sur., dry, TD 4,003 ft., elev. 1,750 ft., estimated, Caddo 3,032 ft., Mississippian 3,902 ft., Ellenburger 3,956 ft.

Coleman County: G. B. Cree 1 Floyd Price, Sec. 46, T&NO Sur., dry, TD 4,150 ft.

E & BC Ida M. West, Sec. 80, J. W. Milligan Sur., dry, TD 1,916 ft.

C. U. Norton and L. J. Maxwell 3 Mrs. M. Knight, Blk. 88, C. Pendleton Sur. 274, dry, TD 4,735 ft., Fry sand 1,722 ft.

Saxon Exploration Co. 1 Lucy Cox, Sec. 238, E. J. Bondzand Sur., dry, TD 2,358 ft.

Jack County: C. H. Brown & Co. 1 W. J. Chambers, Lewis Knight Sur., A-324, dry, TD 3,272 ft.

Walter L. Plemmons 1-S Myrtle Burt, D. O. Kay Sur., dry, TD 440 ft.

Jones County: Great Lakes Carbon Corp. 1 Louise Shepard, 14-4-H&TC, dry, TD 3,878 ft.

Knox County: Yeatman Drilling Co. 2 W. S. Davis, D. G. Burnett Sur. 3, Blk. 3, dry, TD 5,930 ft.

Montague County: George S. Engle 2 C. McCall, ETRR Sur., A-235, dry, TD 5,939 ft.

George S. Engle 1 Parr heirs, 16-11-Calhoun CSL, dry, TD 7,030 ft.

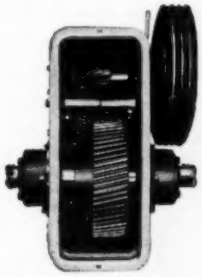
George S. Engle 1 Mrs. A. Pierce, Blk. 102, Panola CSL, dry, TD 6,990 ft.

Palo Pinto County: Ray D. Payne 1 Swenson,

# Only ALTEN PRE-TESTED PUMPING UNITS HAVE ALL THESE BENEFITS

**If you are among those oil producers who feel all pumping units are alike, we invite you to make your own comparison. It will show that Alten units:**

- ☆ **Give longer strokes**
- ☆ **Have higher gear reducer ratings**
- ☆ **Are built with better gears**



**YOU GET THESE ADVANTAGES WITH ALTEN HELICAL GEARS:**

**EXTREMELY ACCURATE GEAR TEETH**
Continuous direction of hob results in cutting accuracy beyond that obtainable from the shaper process which produces herringbone gears.

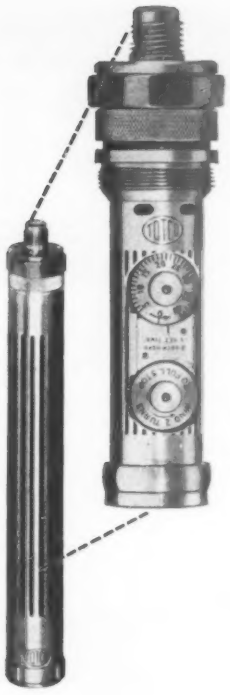
**REDUCED SHOCK LOAD**
Impact or backlash loads are 10 to 20% lower than those on herringbone gears because Helix angles are 50% lower.

**MAINTAIN PERFECT TOOTH PROFILE**
Because Helical Gears have no unflexing centers, stress is evenly distributed over entire face of gear teeth. Tooth profiles are permanently retained.

**FLAME HARDENED TEETH**
Gears are precision cut from finest alloy steel and shaved for perfect profile then flame hardened for highest surface hardness obtainable.

**ALTEN**
*Foundry & Machine Works, Inc.*
LANCASTER, OHIO

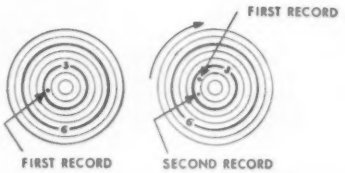
# Now available to all operators



The New Totco Double Recorder, a "self-checking" mechanical drift indicator, provides the ultimate in simple operation, sustained accuracy, and dependable service. Proved in operation, over 1000 in daily use, this new instrument is now offered for sale outside the U.S.A.

## *The New Totco* DOUBLE *Recorder*

The Totco Double Recorder eliminates all doubt about a "wild record." It produces *two* positive, easily read records...the angle indicator and chart holder each move between the recordings. Both records are taken within a 20-second period. With identical records you can be *sure* you know. Write our distributors today for detailed information.




TOTCO

***Technical Oil Tool Corporation***
*1057 N. La Brea Ave., Los Angeles 38, Calif.*

EXCLUSIVE DISTRIBUTORS:

*California*—The Republic Supply Co. of California
*Domestic*—The Continental Supply Company
*Canada*—Oil Well Supply Division
*United States Steel Company*
*Export*—Lucey Export Corporation, New York City

Sec. 102, BBB&C Sur., dry, TD 850 ft.

Shackelford County: B. Baldridge 1 C. A. Nail, Sec. 76, ETRR Sur., dry, TD 1,575 ft.

C. B. Christie 1-B C. A. Nail, Sec. 93, ETRR, dry, TD 1,610 ft.

Stephens County: Alan T. Strong 1 W. M. Ford, Sec. 1,091, TE&L, dry, TD 4,250 ft.

Stonewall County: McAlester Fuel Co. 2 Mrs. H. G. Yakey, Sec. 40, Pumphrey Sur., dry, TD 6,019 ft., Canyon 3,802 ft., Strawn 5,099 ft., Caddo 5,824 ft., Mississippian 5,990 ft.

Taylor County: Yucca Drilling Co. 1 Alvis Parker, John McSherry Sur. 129, dry, TD 3,600 ft., elev. 1,873 ft., Flippen 2,400 ft., Cook 2,441 ft.

Throckmorton County: Ashland Oil & Refining Co. 1 J. B. Matthews, Blk. 6, Comanche Indian Reservation, dry, TD 4,833 ft., Canyon 2,025 ft., Caddo 4,352 ft., Mississippian 4,770 ft.

Wise County: Texas Mid-Continent et al 1 G. C. Young, E. C. Allender Sur., dry, TD 7,217 ft., Caddo 5,632 ft., Atoka conglomerate 6,050 ft.

## Texas Gulf Coast

### Apparent New Pay Seen In East McFadden Field

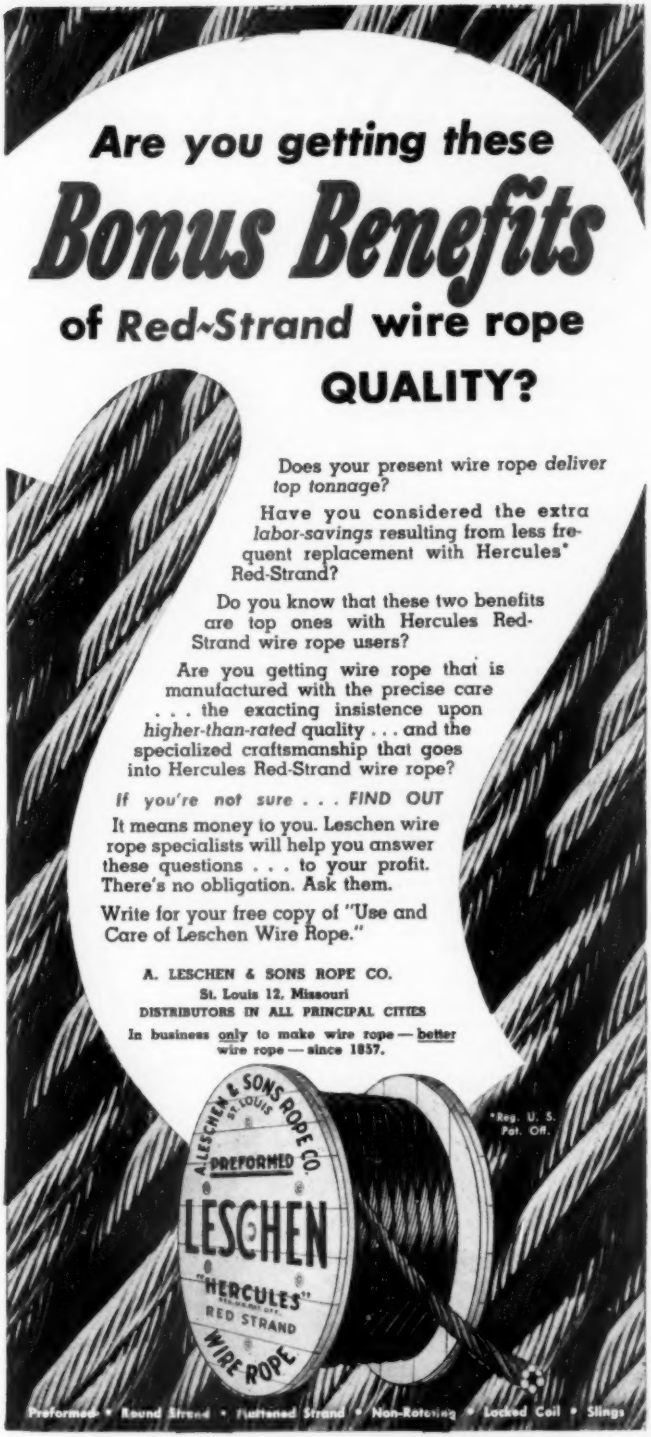
HOUSTON. — Five miles southwest of Bloomington, Union Producing Co. has recovered oil on a drill-stem test at their A-31 McFadden, Victoria County. Drill-stem test from section 6,902-21 ft. revealed a recovery of 800 ft. of oil and 60 ft. of salt water, with 230 psi. working pressure on ¼-in. choke and bottom-hole pressure of 3,275-4,025 psi. Operator ran log at 6,920 ft. and 7-in. protection string was set at 6,919 ft. After setting production string operator drilled ahead and will drill to the proposed depth of 9,500 ft. before any completion test attempts will be made. This well, on the east flank of East McFadden field, is an apparent new pay discovery and will extend production 1,000 ft. easterly. Drill site is on the J. M. Valdez Survey, A-115.

David L. Gordon operating from Houston offices, has filed application to drill the 1 Gussie W. Pettus, a 9,000 ft. wildcat in Goliad County 2 miles west of Angel City. Venture is located 3,000 ft. northwest of Stanolind 1 Bluhm gas-distillate well producing from the Slick-Wilcox zone. Well has estimated elevation of 228 ft. and operator will commence operations when permitted. Drill site is on the Maria de Jesus Y'Barbo Grant.

Floyd L. Karsten has estimated a new field designation in the Liberty Townsite of Liberty County with completion of C-1 E. W. Pickett in a new deep pay sand, ⅞-mile northeast of nearest production on the north flank of South Liberty field. Completion was finaled through perforations with 255 shots at 9,856-94 ft. for 32.46 bbl. of oil per day on 10/64-in. choke, tubing pressure 690 psi. 35.4°-gravity oil, no water, with high gas-oil ratio of 5,561:1. Well was drilled as a "tite" hole to 10,992 ft. with 7⅝-in. and 5½-in. casing cemented at 8,410 ft. Two-in. tubing was swung at 9,867 ft. Top of salt was encountered at 10,987 ft. Pipe line connections were made. The discovery lies in Liberty Townsite, Liberty Town Tract East League, outer block 50.

**TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCAT**

Calhoun County: Western Natural Gas Co. 1-83 State M-31967 St. Tr. 83, San



Are you getting these
Bonus Benefits
of Red-Strand wire rope
QUALITY?
Does your present wire rope deliver top tonnage?
Have you considered the extra labor-savings resulting from less frequent replacement with Hercules* Red-Strand?
Do you know that these two benefits are top ones with Hercules Red-Strand wire rope users?
Are you getting wire rope that is manufactured with the precise care . . . the exacting insistence upon higher-than-rated quality . . . and the specialized craftsmanship that goes into Hercules Red-Strand wire rope?
If you're not sure . . . FIND OUT
It means money to you. Leschen wire rope specialists will help you answer these questions . . . to your profit. There's no obligation. Ask them.
Write for your free copy of "Use and Care of Leschen Wire Rope."
A. LESCHEN & SONS ROPE CO.
St. Louis 12, Missouri
DISTRIBUTORS IN ALL PRINCIPAL CITIES
In business only to make wire rope — better wire rope — since 1857.
A. LESCHEN & SONS ROPE CO. ST. LOUIS
PREFORMED
LESCHEN
"HERCULES"
RED STRAND
WIRE ROPE
*Reg. U. S. Pat. Off.
Preformed • Round Strand • Flattened Strand • Non-Rotating • Locked Coil • Slings

Antonio Bay Sur., TD 9,517 ft., 14 bbl. of oil per day and 370 M.c.f. of gas per day, ¼-in. choke, gas-oil ratio 16,500:1.

**TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES**

Bee County: Kirkwood & Morgan, Inc. 1 Andrew Johnson, Bee Co. School Lands Sur., A-102, dry, TD 4,014 ft.

Rodney de Lange & W. W. Nicholls 3 George Goree, Barton Sur., A-83, dry, TD 7,503 ft.

Producers Corp. of Nevada 1 Alvin Stautzenberger, H. H. Williams Sur., A-403, dry, TD 5,019 ft.

Fayette County: Hamman Oil & Refining Co. 1 Otto Steinhauser, J. Schrader Sur., dry, TD 2,521 ft.

Hamman Oil & Refining Co. 2 Otto Steinhauser, Thos. Toby Sur., dry, TD 2,482 ft.

Fort Bend County: Bilbo Redding Drilling Co. 1 G. B. Leaman et al, Hilmar Brodeck Sur., dry, TD 8,817 ft.

Oil Production Maintenance, Inc. 1 E. R. Stern, Barnabas Wickson Sur., dry, TD 6,270 ft.

Goliad County: Currie B. Davis 2 Mrs. Ada Hanley, M. de la Penasur, dry, TD 4,405 ft.

Hardin County: Sun Oil Co. 1 Vera Martin et al, Georgoria Garcia Lge., dry, TD 10,000 ft.

Harris County: Giddens & Shriver 1 W. D. Sutherland et al, E. Brinson Sur., dry, TD 8,003 ft.

H. C. Spoor 1 J. R. Galbreath, F. Hargrave Sur., dry, TD 7,550 ft.

Karnes County: Magnolia Petroleum Co. 1 J. L. Teas, L. Navarette Sur., dry, TD 8,500 ft.

Liberty County: Sun Oil Co. & Hurt Oil Co. 1 R. M. Perryman, Jr., Amos Green Lge., dry, TD 8,500 ft.

Matagordia County: Pan American Prod. Co. 1 E. A. Gottschalk, Ira Ingram Sur., dry, TD 5,520 ft.

Montgomery County: C. W. Hanslip 1 Darden & Bybee, F. J. Cooke Sur., dry, TD 4,600 ft.

J. Keet Lewis 1 Emma Schweinle, T. J. Stansbury Sur., dry, TD 6,077 ft.

# California

## Guadalupe Field Has Possible New Pay-Extension

LOS ANGELES.—A 1-mile east extension and possible new oil zone discovery apparently has been given Guadalupe field in San Luis Obispo County. The wildcat, Thornbury Drilling Co. 1-152 Union Sugar in 5-10n-35w, had 8⅝-in. casing set at 3,170 ft. after taking in about 550 ft. of formation.

Discovered some years ago, Guadalupe has had but little development because of the very low gravity crude it produces. Since Thornbury took over Continental Oil Co. leases about 2 years ago, it has been steadily extending the field's productive limits at a one-well rate. Successful completion of 1-152 Union Sugar indicates the field to be at least almost 2 miles wide and over 3 miles long. Its 30 producers, largely concentrated on the west edge near the Pacific Ocean, currently are producing almost 2,000 bbl. daily.

Union Oil Co. was preparing to deepen its deep test, 18 Dome, in the Orcutt area. Drilled to 9,805 ft. where 7-in. casing had been set, necessitated because of the bad condition of the hole, for several days the operator swabbed the well in an effort to establish production. On one swabbing test 24.5°-gravity crude was recovered at a 92 bbl. per day rate. Location of the deep test is in 24-9n-34w.

Union's recent Marshallia field discovery, 4 Jesus Maria, was proving to be a better producer than was shown by initial tests. Recent production figures on the well, located in 3-8n-35w, showed it to be producing 272 bbl. of 10.2°-gravity crude daily, cut 16 per cent.

At Oakridge field in Santa Clara Valley, Ventura County, Union was in process of completing 1-3 Oakridge as a new zone discovery. Drilled to 12,180 ft. in search of deep Sespe sand production, the test was plugged back to 5,066 ft. for completion in what appears to be a new pay.

The four producers completed in Oakridge field are producing from about 500 ft. of Luisian section, middle Miocene, encountered above 3,300 ft. The deep test found this pay on its way down, and evidently picked up a slightly deeper oil zone. Production in the shallow zone appears to be controlled by the Santa Susana fault, which is overthrust from the north and the deeper Oak Ridge fault which thrusts from the south. Union 2-10 Oakridge, first well completed in the Luisian pay, penetrated the Santa Susana but not the Oak Ridge fault.

In San Joaquin Valley a development was the discovery of a deeper pay in the Tunis Creek area of the Tejon Hills field. D. K. Partnership 2, 183-29 Corral, in 29-11n-18w, was completed pumping 76 bbl. daily after being plugged back to 2,251 ft. and casing cemented at 2,176 ft. The Tecuya zone, deepest pay heretofore, was topped at 1,654 ft. Top of basement was called at 2,412 ft.

At nearby Wheeler Ridge, Richfield Oil Corp. 16-28 K.C.L.-D evidently has found about 500 ft. of Eocene sand pay. Casing had been set at 9,892 ft. before this 1,000-ft. stepout was drilled into the pay. At 10,425 ft. drilling was halted to run an electrical survey. In both previous wells Richfield did not set casing until after drilling about 150 ft. into the zone. The completion practice was changed so that an idea could be gained of the sand's thickness.

More rapid development of the 1-year old Rosedale field, west of Bakersfield, has been started. Humble Oil & Refining Co. until recently has been using only one or two rigs in developing the field, which now has 11 producers. The company now is using four rigs and has just staked 10 new locations.

**CALIFORNIA SUCCESSFUL WILDCAT**

Kern County, ¼ mile extension to Edison field: E. L. Doheny, Opr. 65 K. P. Farms, NE NE 27-30s-29e, pumped 32 bbl. per day, through perforations at 3,383-3,442 ft., 22° gravity, TD 4,612 ft., plugged back at 3,615 ft., elev. 547 ft.

**CALIFORNIA WILDCAT FAILURES**

Fresno County, Helm area: Coast-Gibson Oil operations 1 Five Point, 2-17s-17e, dry, TD 8,026 ft., elev. 210 ft.

Kern County, Comanche Point area: Kovaleski-Gwynne 1 Kova-Gwynne, 33-12n-18w, dry, TD 970 ft., elev. 970 ft.

Sacramento County, Alta Mesa area: H. L. Alexander & Glenn J. Homan 1 Gill, 13-6n-7e, dry, TD 2,500 ft., elev. 113 ft.

San Luis Obispo County, Midway Sunset area: Oceanic Oil Co. A-1-1 CCMO, 1-32s-22e, dry, TD 4,115 ft., elev. 1,655 ft.

Santa Barbara County, Lompoc area: South Orcutt Oil Co. 1 Barca, 27-8n-34w, dry, TD 5,280 ft., elev. 998 ft.

Santa Cruz County, Pescadero area: Western Gulf Oil Co. 1-A Vosti, 4-19s-4w, dry, TD 5,133 ft., elev. 1,350 ft.


HERCULES MAKES WELL HEAD EQUIPMENT FOR EVERY PRODUCTION REQUIREMENT . . .

HERCULES produces a variety of Tubing and Casing Heads to meet the requirements of today's production needs.

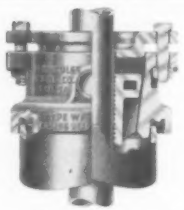
TYPE WF—An economical input Well Head for water-flooding projects. (Illustrated) especially adapted.

TYPE D-4—The ideal Tubing Heads for acidizing wells.

TYPE D-9—Offers the operator a short and compact flanged Head, with slips. This head may be converted into a stripper type head, simply by removing and replacing parts with a HERCULES Neoprene Tubing stripper.

TYPE D-9-R—Designed for use with Reda and other Bottom Hole Pumps.

TYPE J-3—A full opening "Overhead packed" pumping or flowing Well Head with Slips.



Write for complete information on HERCULES Tubing and Heads.

TYPE SOS and SO—The Industry's finest stripper type tubing head designed to meet all present-day production problems.

K-3—An old favorite of the industry — redesigned and improved.

S-H—Designed for slim hole drilling.

SOLD THROUGH ALL SUPPLY STORES

HERCULES TOOL COMPANY

Manufacturers of Oil Field Equipment

TULSA, OKLAHOMA

General Office and Plant: 17th and Phoenix — P. O. Box 286

Telephone 3-1186

Export Representative: OIL FIELD EQUIPMENT CO., INC., T. E. Ward, President • 30 Church St., New York 17, N. Y.

## Southwest Texas

### New Oil Sand Produces At Starr County Strike

CORPUS CHRISTI.—Potential in Sun Oil Co.'s C-2 A. Ramirez, wildcat, in Starr County, produced oil from new sand for the area, which would be the Hockley J-3 sand. Production was effected through perforations shot at 4,834-37 ft., and drill-stem test at 4,832-36 ft. on ¼-in. choke, recovered 180 ft. of pipe line oil, in 14 minutes. Test was taken under a bottom-hole pressure of 380 psi. open and 2,000 psi. closed. Initial potential flowed 10.21 bbl. of oil per day on 5/32-in. choke, under 460 psi. tubing pressure. Flow registered a gas-oil ratio of 28,000:1, and gravity of 49.7°. Top of the Hockley J-3 sand was reached at 4,834 ft. Hole is bottomed to total depth of 5,105 ft., 5½-in. production casing was cemented to 4,950 ft., 2-in. tubing run to 4,815 ft. New discovery is connected to company pipe line.

Delhi Oil Corp. has taken a gage of the 1 Delhi-Atlantic McGill Ranch, wildcat, in Kenedy County, about 7 miles southwest of Riveria. First gage flowed at rate of 75 bbl. of oil per day on 3/16-in. choke from perforations shot at 8,300 ft. Hole is bottomed to total depth of 8,350 ft. with 5½-in. production casing cemented to 8,350 ft. Late reports state discovery is being cleaned, and was making a little mud. Operations are on the Pedro de la Garza Grant, A-35.

Appell Drilling Co. 1 H. M. Childs is a gas discovery in Jim Wells County, approximately 1½-miles southwest of Alice, and 2 miles southwest of Alice field. The discovery was completed through perforations shot at 4,959-75 ft. in the Siler sand. Hole was made to a total depth of 6,340 ft. and 5½-in. production casing was cemented to 5,021 ft., 2-in. tubing was set at 4,956 ft. Top of Siler sand was crossed at about 4,959 ft. Operator potentialed the discovery for 5,400,000 cu. ft. of gas per day on open flow through 12/64-in. choke, discovery flowed estimated 1,023,000 cu. ft. of gas per day, tubing pressure 1,582 psi. Drill-stem test at 4,940-69 ft. on ¼-in. choke, in 10 minutes recovered 8 ft. of distillate-cut mud and 4 ft. of free distillate. Cores pulled at 5,100-37 ft. interval recorded no shows of commercial value. Operator made survey at 5,340 ft. Location is on W. K. McMaster Subdivision, Lavaca Grant Share H-4.

**SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS**

Duval County: La Gloria Corp. 1 A. L. Wied, King & Hillje S/D Garrett Ranch, TD 4,730 ft., IPF 91 bbl. of oil per day, 46.5°-gravity, gas-oil ratio 820:1.

Hidalgo County: Taylor Oil & Gas Co. 3 A. A. McAllen, Santa Anita Grant, TD 10,890 ft., 154.37 bbl. of oil per day on ⅛-in. choke, gas-oil ratio 920:1.

Kleberg County: Ritchie & Mumme 1 M. J. Kivlin et al, Kleberg Town & Imp. Co., Lot 8, TD 2,976 ft., 87.5 bbl. of 21°-gravity oil per day, plus 50 per cent water, gas-oil ratio nil.

Starr County: Mayfair Minerals, Inc. et al 1 Mrs. Helen Zanarine et al, El Benaditon Grant, TD 7096 ft., 86.5 bbl. of oil per day on ⅛-in. choke, 48.3°-gravity oil, gas-oil ratio 1976:1.

Sun Oil Co. & Geo. H. Coates C-2 A. Ramirez, Starr-Jim Hogg Co. line, TD 5,105 ft., 10.21 bbl. of oil on 5/32-in. choke per day, 49.7°-gravity oil, gas-well ratio 28,800:1.

Webb County: Bright & Schiff 1-A J. O.


WHEN THE JOB HAS GOT TO BE RIGHT!

Snap-on*

TORQOMETERS

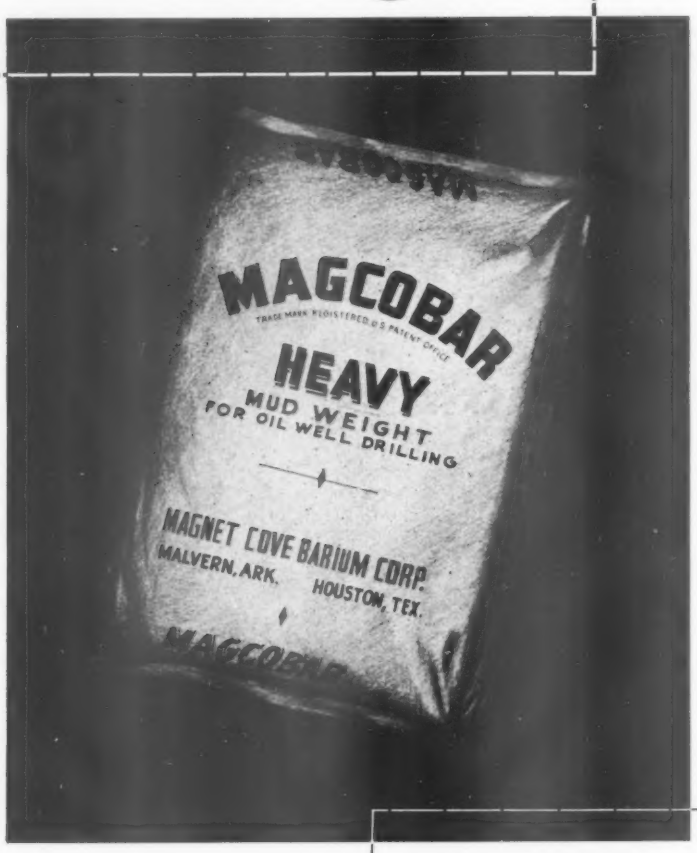
assure Precision Tensioning

It doesn't take a man one second longer to snug down a nut to exact tightness of factory specifications, with a Snap-on Torqometer. Sturdy, accurate Torqometers can easily pay for themselves by saving *just one critical assembling job* from "going bad" when it gets back in service. Even the most skilled mechanics can't be expected to approximate specified bolt tension "by feel." But with Snap-on Torqometers, the exact tension can be applied with ease. Torqometers are available in 15 models, ranging from zero to 30 inch-pounds, up to 2000 foot-pounds torque capacity. Factory branch offices and warehouses in 42 important industrial centers. Write for special Industrial and General Catalogs.

SNAP-ON TOOLS CORPORATION
8098-J 28th Avenue, Kenosha, Wis.

*Snap-on is the trademark of Snap-on Tools Corporation

# It's In The Bag




Every product known to science for the preparation and treatment of drilling muds to meet specific conditions . . . extensive laboratory and research facilities, manufacturing facilities for preparing special drilling mud materials, capable field engineers to assist at the rig, and more than 350 Magcobar Dealers to meet your needs night and day . . . all combine to make up Magcobar's complete drilling mud service. Look for the Magcobar sign when you need mud. You can be sure of the quality when it's in the Magcobar bag.

**MAGNET COVE BARIUM CORPORATION**
*ONE OF THE DRESSER INDUSTRIES*
**HOUSTON, TEXAS**

**Magcobar**
*Complete*
**DRILLING MUD SERVICE**

## Our Name is Mud!

Walker, 5 miles SW Mirando City, TD 1,690 ft., 90 bbl. of oil per day, 24.7°-gravity oil, gas-oil ratio 410:1.

Bright & Schiff 2-A J. O. Walker, 5 miles SW Mirando City, TD 1,696 ft., 70 bbl. of oil per day, 24.5°-gravity oil, gas-oil ratio 295:1.

**SOUTHWEST TEXAS WILDCAT FAILURES**

Bell County: I. A. Burr, Jr. et al 1 Bessie Bigon, A. G. Moore Sur., dry, TD 1,179 ft.

Duval County: Leavitt Corning, Jr. 1 Duwel Co., J. Garcia Sur., A-658, dry, TD 4,025 ft.

Jim Hogg County: Fowell, Nickel & Appell Drilling Co. 1 H. McCampbell, Las Vivoritas Grant, A-266, dry, TD 5,703 ft.

Pontiac Refining Co. 4 Roy Yeager, 5 miles W Hebbronville, dry, TD 3,550 ft.

Tri-Mark Oil Co. 1-A Katherine Parr Hamilton, Herman Pressler Sur. 120, A-256, dry, TD 3,170 ft.

Jim Wells County: Geo. W. Graham et al 3 Jane Ragland, Los Presenos de Abajo Grant, A-171, dry, TD 5,310 ft.

W. Earl Rowe 1 C. D. Jones, La Tinaja de Lara Grant, A-36, dry, TD 5,281 ft.

Kenedy County: La Gloria Corp. et al 1 Laguna Madre St. Tr. 231, 24 miles E of Sarita, dry, TD 9,000 ft.

Kimble County: R. F. Schoolfield et al 1 Dan Morales, 9 miles NNW Junction, dry, TD 1,364 ft.

McMullen County: Anderson-Prichard Oil Corp. 1 Shiner "E," TTRR Co. Sur. 7, A-564, dry, TD 2,260 ft.

Milam County: Dalport Oil Co. 1 W. R. Cyrer, Miguel Davila Grant, dry, TD 2,706 ft.

G. L. Reasor 1 Joe Gibson et al, 8 miles SE Rosebud, dry, TD 5,915 ft.

Nueces County: F. Wm. Carr 1 F. A. Cech et al, 15 miles SE of Corpus Christi, dry, TD 7,515 ft.

Starr County: J. C. McCabe et al 1 Lillie May Baird, 3 miles NW Rio Grande City, dry, TD 4,290 ft.

Wilson County: H. J. Mosser et al 1 Isabel Fahrenthold, 3 miles NW Poth, dry, TD 7,633 ft.

## Eastern Texas

### Willow Springs Field Extended to North

DALLAS.—In Gregg County, Ray Holbert 1 H. C. McGrede extended Willow Springs gas-distillate field to the north with a good producer. On production test the well gaged 8,500,000 cu. ft. of gas a day plus 124 bbl. of distillate. Pay was from the Young zone of the Rodessa at 6,916-32 ft.

New exploration work in Wood County included two Woodbine sand tests. Ralph Spence 1 Paul Gorman was slated as a 5,000-ft. operation about 1 mile south of Winnsboro, and northeast of Winnsboro field. Location is on a 100-acre tract in the G. B. King Survey, and ½ mile west of R. J. Carraway's 8,461-ft. dry hole drilled in 1950.

Second Woodbine test is to be L. A. Grelling 1 Mary Saner, on a 400-acre tract in the Mary Polk Survey. Location is 3 miles east of the Pine Mills Townsite, and contract depth was 5,800 ft.

In Houston County, a 6,100-ft. Woodbine test has been scheduled by Geier-Jackson, Inc. as the 1 J. V. Meyer, 7 miles northwest of Grapeland, and north of the field of the same name.

Hill County reported two new wildcats in

NEW HEAT SAVING EFFICIENCY

- *Longer Life*
- *Custom Molded Precision Pipe Fit*
- *Attractive, Smooth Finish*

Now available in pipe covering and block insulation, Mundet 85% Magnesia permits new heat-saving efficiency. Precision manufacturing on the latest type of automatic equipment insures uniform standards. Extra durability is built into the insulation. It does not "powder", settle or disintegrate. It is unaffected by either steam or water leakage. It maintains an attractive, smooth finish. Precision pipe fit is assured, with no spaces left for the escape of heat. You benefit from the most modern manufacturing facilities for the production of heat insulation. Write for specification information and recommendations. Mundet Cork Corporation, Insulation Division, 7101 Tonnelle Avenue, North Bergen, N. J.

MUNDET

MUNDET

*When You Need Efficiency in Swabbing*

**You Can Depend on Bell Swabs**

Whether swabbing

. . . oil

. . . water

. . . or mud . . .

you can depend on BELL'S DESIGN and QUALITY for

**MAXIMUM RECOVERY**

**BELL RUBBER COMPANY**

- Phone EDgemont 2-1281
- 6001 W. Jefferson
- P. O. Box 4426
- DALLAS 11, TEXAS

the making. Camtex Oil Corp. located 1 A. H. Cartwright as 2,000-ft. test in the E. Hart Survey, 1 mile northwest of Birone. H. A. Coon and D. E. Lee, Fort Worth, are to drill 1 Andrew Mayse as a shallow test in the N. T. Roberts Survey, 3 miles northeast of Mount Calm.

**EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES**

Cherokee County: V. B. Stone 2 Deloch-Bond, Perry Rees Sur., A-707, 6 miles SW Price, dry, TD 3,754 ft., in Woodbine sand, elev. 340 ft.

Freestone County: Humble Oil & Refining Co. 1 C. J. Cartwright, McKinney & Williams Sur., A-883, 5½ miles W Cayuga, dry, TD 8,410 ft.

Henderson County: Sanders & Murchison et al 1 E. W. Adair, Aaron York Sur., A-847, 10 miles NE Athens, dry, TD 4,679 ft., elev. 483 ft., Woodbine sand 4,525 ft.

Kaufman County: J. W. Bibb & W. L. Cox 1 Henry Smith, M. Gilbreath Sur., 4 miles SW Bagwell, dry, TD 2,715 ft., in lower Glen Rose lime.

Red River County: Goss Drilling Co. 3 T. Allen, Wm. Becknell Sur., 1½ miles SW Bagwell, dry, TD 2,715 ft., in lower Glen Rose lime.

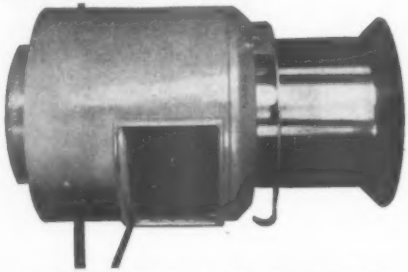
Rusk County: Jeff Bolton 1 A. J. Stallings, Thomas Uzzell Sur., 15 miles SW Henderson, dry, TD 3,880 ft., in Woodbine, elev. 362 ft.

Wood County: General American Oil Co. 1 R. B. Gunter, J. Robbins Sur., A-484, 3 miles N Quitman, dry, TD 6,461 ft., Georgetown 5,240-50 ft.

B. F. Phillips Jr. 1 P. H. McKnight, J. M. Chandler Sur., A-102, 2 miles SW Pine Mills, dry, TD 7,280 ft., sub-Clarksville 6,180 ft., Woodbine 6,835 ft.

**For Safety Unsurpassed**

KELCO *Safety*



**BREAKOUT AND SPINNING LINE CATHEADS**

KelCo Safety Breakout Catheads are available in two sizes—Model 12 for light drilling rigs and servicing hoists—Model 16 for medium and heavy drilling rigs—choice of mechanical, hydraulic or air controls on either model. Tong line and patented tong block furnished at no extra charge.

**AVAILABLE THROUGH YOUR FAVORITE SUPPLY STORE**

**Representatives in All Fields**

*Be Safety Wise — KelCo-Ize*

KELCO BEN F. KELLEY CO., Inc.
TULSA, OKLAHOMA

SPINNING LINE CATHEADS • BREAKOUT CATHEADS • AIR OPERATED POWER SLIPS
TUBING TONGS • SAFETY "C" POLISHED ROD CLAMPS

# Permian Basin

## Andrews Ellenburger Activity Receives Further Boost

MIDLAND.—The importance of northeast Andrews County received a further boost as Phillips Petroleum Co. 1-CC University established good flowing production in the Ellenburger. The wildcat had recovered oil from the Wolfcamp and had flowing oil in the Devonian, which will remain cased off until the Ellenburger is depleted.

Top of the Ellenburger was 13,855 ft., or minus 10,821 ft., which was about flat with Magnolia Petroleum Co.'s multilple-pay discovery of Magutex field 2½ miles to the southeast. First test of the Ellenburger had water blanket at the surface in 42 minutes and oil in 75 minutes. It was cleaned into pits for 75 minutes, then turned into the tanks where it gaged 40 bbl. of oil an hour through ⅝ and 1-in. chokes. The well was still making drilling fluid but had no signs of formation water.

Cities Service Oil Co. has announced a 14,000-ft. wildcat for Ector County, 1½ miles west of South Cowden field. Location has been made in 9-43-T2S-T&P for the firm's 1-Q Elliott F. Cowden, which is on a 2,000-acre block acquired by Cities Service. Nearby production is from the San Andres limestone around 4,200 ft.

In Upton County, south of Rankin, Woodward & Co. and Dan Auld completed 1 Ella Corbett as a Wolfcamp discovery. Initial potential was 336 bbl. of 32°-gravity oil a day through open tubing, from perforations at 6,130-60 ft. Nearest production is about 4½ miles southwest in Crockett field where production is from the Grayburg around 1,450 ft.

Wilshire Oil Co. 32-41 Gantt, central Upton County Ellenburger failure, has been plugged back to complete as a small Spraberry discovery, pumping 80 bbl. of 38°-gravity oil a day. Top of the Ellenburger was 12,985 ft. on elevation of 2,764 ft. Total depth was 13,209 ft. Top of Spraberry pay was 7,560 ft. Pay perforations were at intervals from 7,560-8,260 ft.

In Yoakum County Amerada Petroleum Corp. 1 Weems was drilling ahead at 11,430 ft. with no tests reported below the section at 11,020-95 ft. which developed 205 bbl. of oil in 2½ hours.

Sinclair Oil & Gas Co. 1-A McGinty, wildcat 10 miles west of Plains, found water in top of the Devonian and was drilling ahead at 12,028 ft. Top of the Devonian was 12,008 ft. and interval tested was from 11,991-12,022 ft.

Hubbard S. Russell 4-2 Wrage Hendrickson "B," deep test on the east side of Tex Harvey field in Glasscock County, called top of the Devonian at 11,024 ft. A core from 11,022-46 ft. was hard limestone with some free gas and oil shows. Operators continued drilling below 11,056 ft.

In the Texas Panhandle Sinclair Oil & Gas Co. 1 Isaacs, northwest of Gem in Hemphill County, was drilling below 11,865 ft., with no shows reported.

Morgan & Head 1 Morrison Ranch, 12-C-G&M, Roberts County, had total depth at 7,058 ft. and was waiting on cement after running casing to 7,037 ft. Gulf Oil Corp. 1 Haggard was plugged back to 7,188 ft. from total depth of 9,400 ft. and was testing. Gulf 3 Haggard was drilling below 5,116 ft., and their 4 Haggard was drilling ahead following a drill-stem test at 4,140-65 ft. which developed salt water.

### WEST TEXAS (DISTRICTS 7-C AND 8) SUCCESSFUL WILDCATS

Ector County: Herman and George Brown 1 David Fasken, 17-42-T1N-G&MMB&A, TD 10,314 ft., elev. 2,990 ft., IP from lower Wolfcamp perforations 9,640-62 ft., 231 bbl. 45°-gravity oil, ¾-in. choke, TP 175 psi., GOR 731 cu. ft.; IP upper Wolfcamp perforations 8,730-44 ft., 768 bbl. 45°-gravity oil, ¾-in. choke, CP 600 psi., GOR 625 cu. ft.

Gaines County: The Texas Co. 1 R. A. Cox, 12-C45-PSL, TD 12,776 ft., elev. 3,227 ft., Wolfcamp 9,205 ft., IP pumped 51 bbl. 24°-gravity oil.

Howard County: Crane Oil Co. of Texas 1 Hassie Clayton, 35-32-T3N-T&P, TD 8,003 ft., reef pay 7,989 ft., IP 82 bbl. 43°-gravity oil, ¼-in. choke, TP 50 psi., GOR 575 cu. ft.

Standard Oil Co. of Texas 1-I C. L. Jones, 59-20-Lavaca Navigation Co. Sur., TD 2,936 ft., elev. 2,319 ft., pay 2,890 ft., IP 243 bbl. 26°-gravity oil, ½-in. choke, TP 75 psi., GOR 322 cu. ft.

Kent County: Chapman & McFarlin 2 D. M. Cogdell, 775-97-H&TC, TD 4,595 ft., elev. 2,162 ft., pay 4,525 ft., IP pumped 86 bbl. 38°-gravity oil.

Runnels County: Mar Tex Realization Corp. 1 E. F. Bryon, Blk. 599, Wm. Smith Sur., TD 4,427 ft., elev. 1,879 ft., pay 4,421 ft., IP 246 bbl. 46°-gravity oil, 20/64-in. choke, GOR 460 cu. ft.

### WEST TEXAS (DISTRICTS 7-C AND 8) WILDCAT FAILURES

Andrews County: Penrose-Anderson 1 Wolfe, 23-A-28-PSL, dry, TD 4,379 ft., elev. 3,514 ft., San Andres 4,313 ft.

Ector County: V. A. Brill 1 Sallie Ratliff, 11-42-T1S-T&P, dry, TD 13,874 ft., elev. 2,989 gt., Wolfcamp 8,490 ft., Strawn 10,125 ft., Devonian 11,870 ft., Ellen- of clean oil on a 2-hour drill-stem test in burger 13,644 ft.

El Paso County: Humbolt Casad 1 Coronado Realty Co., S. F. Miller Sur. 214, dry, TD 2,010 ft., in pre-Cambrian.

Gaines County: T. J. Clark, Anson & Welfelt 1 Ford, 6-A12-PSL, dry, TD 7,339 ft., elev. 3,551 ft., Clear Fork 6,230 ft., Tubb 6,760 ft.

Hancock Oil Co. 1 E. O. Nelson, 256-G-WTRR, dry, TD 6,149 ft., elev. 3,364 ft., Clear Fork 6,130 ft.

Magnolia Petroleum Co. 1 W. C. Hicks, 16-273-Loving CSL, dry, TD 13,271 ft.

Mid Western Drilling Co. 2 Winnie I. Ford, 6-A13-PSL, dry, TD 4,667 ft.

Union Oil Co. of California 1 Mrs. P. S. Dunbar, 25-A12-PSL, dry, TD 7,304 ft., elev. 3,563 ft., Clear Fork 6,102 ft.

Glasscock County: Seaboard Oil Co. et al 1-A Bishop, 29-32-T5S-T&P, dry, TD 6,385 ft.

Howard County: Stephens Petroleum Co. 1 Simpson, 43-31-T3N-T&P, dry, TD 7,944 ft., elev. 2,699 ft., Spraberry 5,810 ft., Dean 7,100 ft., reef 7,908 ft.

Martin County: Stanolind Oil & Gas Co. 1 Gladys H. Cowden, 30-40-T1N-T&P, dry, TD 13,308 ft., elev. 2,896 ft., Pennsylvanian 10,462 ft., Mississippian 11,620 ft., Devonian 11,926 ft., Ellenburger 13,104 ft.

Pecos County: Hunt Oil Co. 45 Elsinore, 5-B-GC&SF, dry, TD 1,712 ft.

Reagan County: M. J. Brannon Jr. et al 2 University, 8-11-University, dry, TD 2,630 ft.

Reeves County: E. M. Craig 1 H. K. Dudley, 1-C20-PSL, dry, TD 3,450 ft., elev. 2,829 ft., Delaware lime 3,370 ft., sand 3,405 ft.

Tubb-Gann Drilling Co. 1 State, 12-57-T3-

(Continued on page 243)

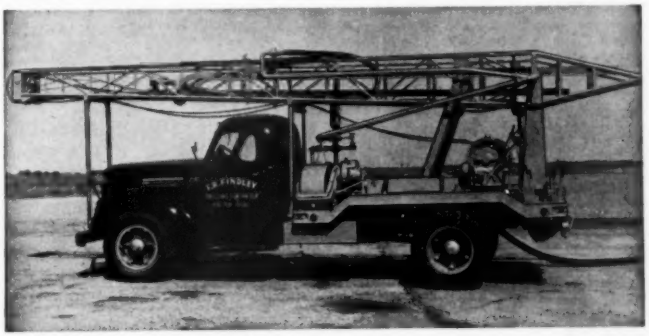
## South Louisiana

### New Pay Opened in East Golden Meadow Field

NEW ORLEANS.—Humble Oil & Refining Co. has opened new pay in East Golden Meadow field, Lafourche Parish, at the 6 LL&E "C" for a flow of 53 bbl. of 59.7°-gravity distillate plus 1,392,000 cu. ft. of gas daily on ¼-in. chokes. Flowing through perforations at 10,718-722 ft., well was completed under 1,550 psi. pressure. Gas-oil ratio was 373:1. This is the third test completed in the field, and is bottomed at 10,846 ft. with 5½-in. casing cemented at 10,723 ft. and 2-in. tubing swung at 10,613 ft. Electrical log run to total depth recovered 11 ft. of gas-distillate sand at 10,705-721 ft. Well is located in Section 30-19s-23e.

Flowing at the rate of 39.6°-gravity distillate plus 2,016,000 cu. ft. of gas daily on 10/64-in. chokes, Stanolind Oil & Gas Co. has completed its 2 C. F. Henry "A" just north of Cameron townsite. Tubing pressure was 3,200 psi. and gas-oil ratio 50,909:1. Hole, bottomed at 11,542 ft. in sidetrack hole, has opened a new pay for the field, flowing through perforations at 9,143-48 ft. Seven inch casing is cemented at 10,304 ft. and 2-in. tubing is set at 9,083 ft. Originally drilled to 13,306 ft., well was plugged back and sidetracked around 11,000 ft. Prior to taking potential, well flowed at rate of 13.55 bbl. of distillate on 10 hour drill-stem test through ¼-in. by ⅜-in. chokes. Well is located in Section 30-14s-9w.

New pay zone has been opened in Potash field, Plaquemines Parish, at the Humble Oil

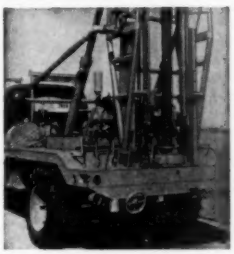



# FRANKS KC 38-S Is *BUILT*

**FOR SEVERE SHOCK IN HARD DRILLING OF SHOT HOLES, CORE DRILLING AND WATER WELLS**

Franks Model KC 38-S is designed for hard drilling in loose boulder and rock formations. Materials are made of the highest quality. Shafts are high alloy heat treated steel and are ground finished. Standard makes or parts are used throughout to facilitate repairing. The KC 38-S is equipped with a 10 ft. mechanical pull-down feed mechanism for use in hard formations. A jaw clutch arrangement permits gravity feed drilling. This makes it ideal for shot-hole, core drilling and water well work having a capacity of 1000 ft. using 2⅜" tool joint drill pipe. The KC 38-S weighs 10,000 lbs. less truck.

**Write today for complete specifications and information on the Franks Heavy Duty Model KC 38-S Drill.**



**MODEL KC 38-S DRILL**

**Chain drive power takeoff, capable of transmitting entire horsepower of engine under all conditions.**

**Rotary table has 5¼" opening, heavy duty bearings, oil bath type.**

**Free spooling, double drum draw works, equipped with jaw clutches; 10,000 lbs. single line pull capacity. Mud pump—Gardner-Denver FXG 4½ x 8.**

Franks MACHINE CO.

205 East Maine Enid, Okla.

*Exclusive Export Distributor*

ACME WELL SUPPLY COMPANY

19 Rector St. New York City

& Refining Co.'s 6 Louisiana State 508-Mississippi River. Section 13-18s-15e. On 4-hour test, well flowed at rate of 193.7 bbl. of 33.8°-gravity oil plus 217,000 cu. ft. of gas daily on ⅛-in. choke. Tubing pressure was 1,775 psi., with gas-oil ratio 1,113:1. Bottomed at 11,264 ft. with 7-in. casing set at 11,035 ft. and 2½-in. 10,204 ft. well was complete dthrough perforations at 10,506-526 ft. On open hole drill-stem test at 11,196-206 ft., operator recovered 150 ft. of gas-cut mud.

**SOUTH LOUISIANA SUCCESSFUL WILDCAT**

West Baton Rouge: Circle Drilling Co. 1 Catherine Sugar Corp., Sec. 37-7s-11e, TD 9,500 ft., IPF 322 bbl. of oil per day on 3/16-in. choke, 41°-gravity oil, gas-oil ratio 978:1.

**SOUTH LOUISIANA WILDCAT FAILURES**

St. Helena Parish: Texas Pacific Coal & Co. 1 Natalbany Lumber Co. "A," Acct. 1, Sec. 26-3s-4e, TD 10,499 ft., dry, TD 10,499 ft.

St. Tammany Parish: The Texas Co. 1 St. 2040 Bayou Bonfouca, North Shore in Lake Ponchartrain in 10s-13e, dry, TD 11,143 ft.

Terrebonne Parish: Southern Production Co., Inc. 1 St. Lse. 1799, Caillou Bay, dry, TD 13,500 ft.

# Rocky Mountain

## Slope County Wildcat Recovers Oil Shows

DENVER—Deep Rock Oil Co. has reported recovery of slightly oil and gas-cut mud from a rank wildcat in North Dakota's Slope County in the southeastern corner of the state.

The show is the first of this caliber to be reported outside the Nesson anticline area of Williams and McKenzie counties, where all North Dakota production to date has been established.

The Deep Rock wildcat is 1 Brusich, SE SE SE 8-135n-98w, 50 miles east of the Montana border. Charles was topped in the well at 8,016 ft. and on 3-hour test of the interval 8,420-30 ft. the recovery was 517 ft. of slightly oil and gas-cut mud. Flowing pressure on the test was 775-950 psi., shut in pressure 3,425 psi. A second test from 8,463-8,505 ft. recovered 60 ft. oil slightly oil and gas-cut mud, with flowing pressure of 530 psi.

A core from 8,455-8,505 ft. consisted of anhydrite, shale, dark brown crystalline lime with pinpoint porosity and oil odor and fluorescence. The operator is reported coring ahead, with the formation at the present depth not identified.

While commercial important cannot be attached to the shows so far reported in the Deep Rock wildcat, prior to acid treatment, the show is of extreme importance to the future of drilling programs in this portion of the Williston basin.

Another wildcat being drilled by Deep Rock, the 1 Johnson, C SW SW 30-139n-86w, in Morton County, North Dakota, recovered water cut with noninflammable gas from the interval 6,570-6,620 ft. A tentative top of Mission Canyon was reported at 6,580 ft. in this well.

Also in a rank wildcat area of eastern Montana Deep Rock reported cores showing fluorescence and odor from the 1 Picard, C NW NE 6-29n-58e, Roosevelt County, Montana. Cores from 8,405-58 ft. consisted of dark gray hard shale, and a fossiliferous brown limestone with faint odor and spotted fluorescence. The operator is running drill-stem test on the wildcat.

**WYOMING SUCCESSFUL WILDCAT**

Hot Springs County: Pacific Western-Ohio Oil Co. 1 Government, SW SW SE 27-46n-98w, pumped 168 bbl. of oil per day from Curtis 3,825 ft., TD 5,054 ft.

**WYOMING WILDCAT FAILURES**

Fremont County: B&L Drilling Co. 1 Coolie, C SW NE 28-33n-100w, dry, TD 542 ft.

R. C. Parrent 1 State, NW NE NW 16-39n-91w, dry, TD 411 ft.

Washakie County: Seaboard Oil Co. 1 Government, NW NW NW 25-43n-89w, dry, TD 2,742 ft.

Sun Oil Co. 1, SW SW SW 33-46n-88w, dry, TD 2,742 ft.

**COLORADO WILDCAT FAILURES**

Delta County: James M. Cline 1 Cline, NW SE NE 36-14s-94w, temporarily suspended, TD 1,094 ft. in granite.

Kit Carson County: Continental Oil Co. 1 Powell, NE NE NE 34-8s-45w, dry, TD 6,099 ft.

Logan County: Falcon-Seaboard and Lee Swedlund 1 McRoberts, SW SW NE 1-8n-53w, dry, TD 4,900 ft.

Washington County: R. L. & J. L. Rush 1 Lintz, NW NW NE 30-2s-52w, dry, TD 5,073 ft.

**WESTERN NEBRASKA WILDCAT FAILURES**

Cherry County: Champlin Refining Co. 1 Hull, SW SW SW 11-29n-40w, hole junked and abandoned, TD 4,551 ft.

Champlin Refining Co. 1 Dorsey, SE SE SE 12-30n-40w, dry, TD 3,050 ft.

Champlin Refining Co. 1 Vinton, SW NW SE 13-30n-39w, dry, TD 4,414 ft.

Champlin Refining Co. 1 Shadbolt, NW NW NW 1-31n-37w, dry, TD 3,377 ft.

Cheyenne County: Plains Exploration Co. 1 Brauer, SW SW NE 31-13n-48w, dry, TD 4,776 ft.

Hope Oil Co. 1 Springer, NW NW NW 6-13n-51w, dry, TD 5,189 ft.

Deep Rock Oil Corp. 1 Thompson, SE NE NW 12-14n-51w, dry, TD 5,055 ft.

Hope Oil Co. 1 Grabolwskie, NW NW SW 17-15n-48w, dry, TD 4,610 ft.

Perl Smith 2-A Doran, NW SE NE 8-15n-49w, dry, TD 4,708 ft.

Dawson County: Roden, Darden & McRaie 1 Jessen, C SW SW 1-11n-22w, dry, TD 3,258 ft.

Kimball County: Trigood Oil Co. 2 Nelson, SE SE SW 28-14n-53w, dry, TD 5,668 ft.

True & Brown 1 Durland Trust, SE SE SE 15-14n-56w, dry, TD 6,625 ft.

**UTAH WILDCAT FAILURES**

San Juan County: Skelly Oil Co. 1-A Unit, SE NW NW 27-40s-12e, dry, TD 6,713 ft.

Uintah County: Stanolind Oil & Gas 1 Margery Wall, NW NW SE 10-11s-22e, dry, TD 5,503 ft.

Wasatch County: Union Oil Co. of California 1 Unit, SW SW SW 35-3s-11w, (USM), dry, TD 7,015 ft.

**MONTANA SUCCESSFUL WILDCAT**

Dawson County: The Texas Co. 1 NPG (NCT 4), C SW SW 23-17n-53e, flowed 191 bbl. of oil per day from Madison 7,992 ft., TD 9,953 ft.

**MONTANA WILDCAT FAILURES**

Carter County: McDonald Hydraulic Drilling Co. 1 Tucker, C SE NE 19-3n-59e, dry, TD 8,710 ft.

Dawson County: The Texas Co. 1 (NCT 3), C NE SE 19-17n-53e, dry, TD 10,892 ft.

Hill County: Northern Pump 1 O'Neill, NE NW NE 2-31n-17e, dry, TD 3,928 ft.

Pondera County: Sabo-Johnson Co., Inc. 1 Gernact, SW NE SW 6-27n-1w, dry, TD 1,400 ft.

Rosebud County: Carter Oil Co. 1 Perry, C SE NW 23-5n-42e, dry, TD 7,584 ft.

**NORTH DAKOTA WILDCAT FAILURE**

Stutsman County: General Atlas Corp. 1 Alex Peplinski, C NW 21-142n-63d, dry, TD 2,919 ft. granite 2,915 ft.

# Oklahoma

## Beaver County Discovery Being Completed on Pump

DEEP ROCK OIL CORP. has placed its 1-A Shadden, new Beaver County oil-discovery well, on the pump for final production tests. During the first 11½ hours, it made 146 bbl. of oil, producing from Morrow sand, opposite which casing is perforated at 7,316-22 ft. A previous 20-hour swabbing test recovered 119 bbl. Location of the discovery is in the C NE NW 25-3n-24eCM, about 10 miles southwest of the town of Beaver.

Prospects of a long southeastward extension of Springer sand development to the shallow Madill pool, in Marshall County, southern Oklahoma, are given by producing oil showings encountered by L. W. Powell at his 2 Godfrey, NE SE NW 31-5s-6e. The well, located at the south tip of the pool, logged Springer sand at 1,516 ft. and recovered porous sand with good staining and odors in cores at 1,529-47 ft. A 90-minute drill-stem test at 1,532-55 ft. got gas in 70 minutes and recovered 200 ft. of 40°-gravity oil.

J. F. Smith is opening a new Hunton lime pool in Pottawatomie County, where his 1 Flanigan, SW SW NW 17-7n-2e, flowed at the rate of 20 bbl. of oil per hour through casing perforated in the Chimney Hill zone at 5,732-48 ft., following acidization. Wilcox sand, to which the well was drilled, was unproductive. Location is about a mile northeast of the Cat Tail Springs pool, which produces from the second Wilcox sand.

Gulf Coast Western Oil Co. and William Broadhurst have an indicated shallow-sand discovery well in the Lone Grove area, Carter County, at their 1-B Croom, SE SW SE 20-4s-1e. The well encountered heavily oil-saturated sand at 2,008-68 ft. and, after being drilled to 2,200 ft., has 7-in. casing run to the top of the pay for completion. The well is a twin (80 ft. west and 10 ft.) to 1 Croon, which also found the sand but which, after being deepened to 6,300 ft., recently was quit as a junked hole with collapsed pipe. The new well found the sand 162 ft. higher than in the first hole.

**OKLAHOMA SUCCESSFUL WILDCAT**

Noble County: Arrow Drilling Co. 1 Patterson, NW SE NW 30-22n-1e, 60 bbl. of oil from Mississippian lime 4,758-71 ft., TD 4,771 ft.

**OKLAHOMA WILDCAT FAILURES**

Beckham County: D&L Oil Co.-W. F. Bush 1 Simpson, SW SW NE 1-8n-22w, dry, TD 4,505 ft.

Carter County: Gulf Coast Western 1 Croom, SE SW SE 20-4s-1e, dry, TD 8,355 ft.

Creek County: Parker Drilling Co. 1 Anthis, SW SW NE 1-19n-7e, dry, TD 2,800 ft.

Jefferson County: Goff Leper Drilling Co. 1 Miller, NW SW NW 13-4s-5w, dry, TD 5,011 ft.

Johnston County: Jno. W. Cone & Associates 1 Pickens, SW NW SE 16-2s-5e, dry, TD 612 ft.

Kay County: Manahan Oil Co. 1 Morrill, NW

*Perfect for Work-over Rigs*

# GUIBERSON

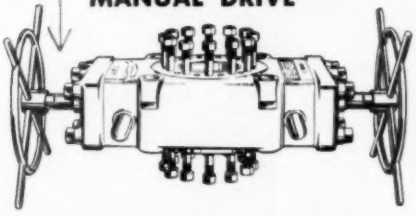
# BLOWOUT PREVENTER

*with Chain Drive*

- This work-over special is also ideal for small hole drilling.
- Chain Drive provides tight seal with one man operation.
- Two Types—A for working pressures to 3000 psi (6000 psi test) —7⅜" opening.

  B for working pressures to 2000 psi (4000 psi test)—9-1/16" opening.
- Short and compact design—body is only 11½" high.
- Keeps well head equipment close to ground.
- Designed to use two preventers in combination without need of flanged adapters.
- Connecting tie bolts and nuts furnished at no extra cost on original sale of dual preventers.

**TYPE A**
**BLOWOUT PREVENTER**
**MANUAL DRIVE**



THE

## GUIBERSON

CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

# CLEAN TANKS *FAST!*

This job used to be done with buckets, shovels and many man-hours; like emptying a barrel with a teaspoon. Now it's a simple operation with a Thompson Unitized Vacuum Tank. It makes "short" work of material-moving problems that once were "all" work.

Muck (any liquid or semi-solid) is drawn into the pickup hose-end which is easily moved about. **One man loads, drives the truck and unloads at the discharge point.** Adaptable to jobs in every petroleum industry operation, the Vacuum Tank is always working. It cleans tanks and cooling tower basins, drain sumps and cellars, transfers mud, oil, water, acid sludge, etc., agitates mud and puddles trenches . . . sprays weeds, roads and dikes.

Made to your exact specifications, with capacities of 20 to 100 bbls., the complete unit can be mounted on your truck, trailer or semi, or skid mounted.

***WRITE!*** Describe your operations. Specific application information by return mail.

SOLE LICENSEE TO MANUFACTURE VACUUM TANKS UNDER U.S. PATENT NO. 2522077

**THOMPSON TANK & MANUFACTURING CO. INC.**

2019 E. Wardlow Road
Long Beach 7, California

*Are your* **OIL INVESTMENTS** *Closely Held or Family Owned?*

We specialize in the making of oil loans and advising on the financial problems of independently owned oil and gas producing properties.

C. LESLIE RICE, JR.
*Vice President*

J. F. DOUGHERTY
*Vice President*

*Oil Department*

**Empire Trust Company**

**7 WEST 51st STREET**

**at Rockefeller Center, New York, N. Y.**

# YOU SAVE with GEOLOGRAPH

**Ask the men who use this service!**

Whether you ask the Geologist, Engineer, Superintendent, Contractor, Toolpusher, Driller or the Operator . . . they'll all tell you that you save when you log as you drill — with Geolograph!

**GEOLOGRAPH**
MECHANICAL WELL LOGGING SERVICE
P.O. Box 1291 • Oklahoma City 1, Okla.

Farmington, New Mex.—Liberal, Kan.—Oklahoma City, Oklahoma
Abilene, Houston, Odessa, Lubbock and Wichita Falls, Texas
Bakersfield, Cal.—Shreveport and Baton Rouge, La.
Casper, Wyo.—Glendive, Mont.—Sterling, Colo.
Calgary and Edmonton, Alberta, Canada
Regina, Saskatchewan, Canada

NW NE 31-28n-1w, dry, TD 4,386 ft.
Logan County: McConnell & Pryor 1 Danham, NE NE NE 27-16n-1w, dry, TD 5,668 ft.
Osage County: W. G. Ingersall 3 Osage, NE SE SE 24-23n-9e, dry, TD 592 ft.
Pontotoc County: Noble V. Miller 1 George, SE NE SW 1-3n-5e, dry, TD 2,000 ft.
Pottawatomie County: Ohio Oil Co. 1 Hudson, NE SE SW 30-7n-2e, dry, TD 6,085 ft.
Pushmataha County: John H. Turner et al 1 Stamper, NW NW NE 20-2n-19e, dry, TD 600 ft.

## Canadian Fields

### Virden Area Test Recovers Mississippian Oil

CALGARY.—Bailey Selburn Oil & Gas, Ltd., a Calgary-based Canadian independent, has indicated an oil success from the Madison limestone at its first driller in Manitoba, at a venture on farmout lands from the California-Standard Co. in the Hargrave area.

The indicated success is Baysel-Cal-Standard 2-21 Hargrave, on LSD 2, 21-11-27w1, 2 miles northwest of Hargrave railpoint and 50 miles west-northwest of Brandon. Bailey Selburn officials stated that the Madison pay zone was encountered approximately 150 ft. above the estimated water line at the Cal-Standard-Hargrave well ¼ mile to the south. That Cal-Standard well found oil encouragement earlier this year gave up 94 bbl. of oil during swab tests in February and was abandoned.

Crew cored 10 ft. into the Madison, and initial drill-stem test at around 2,200 ft. yielded 90 ft. of gassified oil and 60 ft. of clean oil. Gravity of the crude was about 32°. Coring and testing will continue for approximately 100 ft. Company engineers believe that commercial production will result after the formation has received a Hydrafrac treatment.

The Baysel well, as is the case with the Cal-Standard well which is ¼-mile south offset, is believed to be on a separate structure from Virden oil pool, 6 miles to the south. However, it will not be possible to determine whether this is a new discovery or extension to the Virden field until drilling has been carried out between the two areas.

**CANADIAN SUCCESSFUL WILDCATS**

Western 1-10 Hairy Hills, LSD 10, 1-55-14w4, TD 2,310 ft., capped gas well.
Trend Petroleums 1, LSD 6, 25-39-19w4, TD 4,241 ft., capped gas well.

**CANADIAN WILDCAT FAILURES**

Imperial 15-14 Labyrinth, LSD 15, 14-48-23w4, TD 6,020 ft.
Imperial-Central-Del Rio 1-35 Big Hay Lake, LSD 1, 35-48-22w4, TD 5,570 ft.
Lee Carlson-Maygill 1 Gateway, LSD 4, 30-7-22w4, TD 5,399 ft.
Sweetgrass 1 Decalta, LSD 13, 19-7-22w4, TD 5,344 ft.
Admiral-British Empire 1 Poplar, LSD 9, 7-52-23w4, TD 3,820 ft.
Baysel-Hoselaw 1-27 Kehiwin, LSD 1, 27-59-7w4, TD 2,042 ft.
Imperial 16-11 Legal, LSD 16, 11-57-25w4, TD 5,370 ft.
Old Smoky-Seaboard 1 Parker Lake, LSD 8, 28-69-4w5, TD 5,006 ft.
Maralta & Associates 2, LSD 10, 28-48-17w4, TD 4,350 ft.

## Kansas

### Swabbing Yields Oil in Thomas County Wildcat

TRANS-TEX OIL CO. and associates prospective oil-discovery well, 1 Keller, in previously unproductive Thomas County, western Kansas, swabbed 12 bbl. of oil with 16 bbl. of water in 5½ hours in starting production tests of its indicated Mississippian pay zone, opposite which casing is perforated at 4,680-84 ft. Hole was plugged back to 4,724 ft. after being drilled to 5,100 ft. in Arbuckle, topped at 4,999 ft. Location, in the NE NE SW 19-9-32, is 1½ miles southeast of Mingo and 14 miles southeast of Colby, county seat, in the southeastern part of the county. It is more than 20 miles from the nearest other oil pool.

White Eagle Oil Co.'s new discovery well, 1 Koelsch, SE SW SW 24-24s-14w, 4 miles southwest of St. John and 1¼ miles northeast of the Pleasant Hill field, in southwestern Stafford County, flowed at the rate of more than 50 bbl. of oil per hour through 48/64-in. choke after being acidized. Pay zone is opposite casing perforations at 3,750-58 ft. in the Lansing lime. Before acidizing, it swabbed 21 bbl. in a 4-hour test.

Heathman & Co. 1 Spangenberg, a wildcat located ¾ mile north of the Spangenberg pool, in northeastern Stafford County, recovered 630 ft. of oil without any water in a 60-minute drill-stem test at 3,685-95 ft. in the top of Arbuckle (top 3,687 ft.), and has casing run to 3,689 ft. for completion.

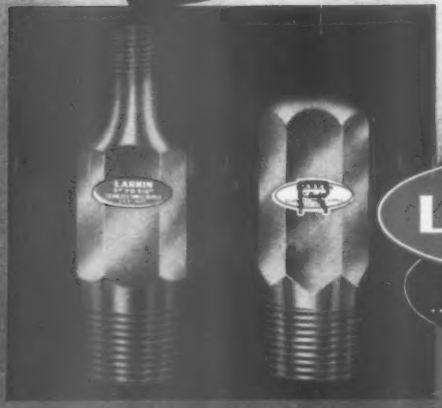
Jones, Shelburne & Farmer have an indicated Lansing discovery well in southeastern

# Uniform
# STRENGTH
# SIZE
# FINISH

**Larkin Forged Steel Swage Nipples and Bull Plugs are absolutely uniform in every respect and make your hook-up job easier, faster, safer.**

**Be sure you use only the very best all the way through—Specify Larkin every time.**

1. **Seamless and weldless construction.**
2. **Made from new, full-weight material.**
3. **Accurate threads—beveled for easy starting.**
4. **Square faced ends.**
5. **Chamfered inside edges.**
6. **Ample tong space.**
7. **Rustproof Zincoting for threads and body—inside and out.**
8. **Packaged in damage-proof cartons for shipping and storing.**



* Larkin Hexagonal Swages and Bull Plugs for easy hookup with open end wrench.
* Larkin Bull Plugs and Swage Nipples in Sizes 2" and under are available in SAE 8620 steel. (Refinery Alloy)

**LARKIN**

...Through Your Supply Store

**LARKIN**
PACKER COMPANY, INC.
ST. LOUIS, MO.

Trego County at their 1 Groff, SW SW SW 26-14s-21w. A 60-minute drill-stem test at 3,493-3,510 ft. in the Lansing recovered 186 ft. of clean oil with 62 ft. of muddy oil and 744 ft. of gas. Arbuckle, cut at 3,855-65 ft. was dry and casing has been run to complete in the Lansing.

### KANSAS SUCCESSFUL WILDCATS

Ellsworth County: El Dorado 1 Andrews, NW NW NW 4-17s-8w, flowed 132 bbl. of oil from Arbuckle 3,302-05 ft., TD 3,305 ft. (opens Andrews pool).

Finney County: Cooperative Refining-Northern Pump 1 Stewart "A," NE SW NW 6-23s-30w, 24 bbl. of oil from 4,738-46 ft., XX 4,817-25 ft., TD 4,999 ft.

Graham County: Murfin Drilling Co. 1 Schnebly, SE SE SE 8-8s-22w, 214 bbl. of oil from Lansing-Kansas City 3,495-3,510 ft., TD 3,721 ft.

### KANSAS WILDCAT FAILURES

Butler County: R. J. Wixson et al 1 Reed, SW SW SE 29-25s-3e, dry, TD 2,816 ft.

Cowley County: H. H. Blair-Hill & Hill 1 Iraton, SW SW NE 11-32s-3e, dry, TD 3,415 ft.

Ellis County: Lindas 1 Stecklein, SE SE SW 28-14s-18w, dry, TD 3,783 ft.

Musgrove 1 Kippes, SW SW SE 13-15s-17w, dry, TD 3,596 ft.

Graham County: T. Gore 1 Hill City, NW NW NE 12-8s-23e, dry, TD 3,930 ft.

Empire Drilling Co. 1 Madden, SW SW SW 8-8s-25w, dry, TD 4,480 ft.

Greenwood County: Mallard Drilling Co. 1 Anderson, CNL NE SW 14-25s-10e, dry, TD 2,090 ft.

Mouser Drilling Co. 1 Anspaugh, SE NW NE 17-27s-10e, dry, TD 2,200 ft.

McPherson County: Ash-Mar Drilling Co. 1 Kirby, SE SE NE 8-18s-1w, dry, TD 2,797 ft.

Pawnee County: Mastin & Hyde 1 Finger, NE NE SE 31-20s-16w, dry, TD 3,891 ft.

Rush County: Overland 1 Burgardt, NW NW SE 4-16s-17w, dry, TD 3,550 ft.

Russell County: Nadel & Gussman 1 Dumler, NW NW SE 2-13s-14w, dry, TD 3,200 ft.

Sedgwick County: Saturn Drilling Co. 1 Walker, SE SE NE 16-29s-1w, dry, TD 3,461 ft.

Sheridan County: Anschutz 1 Rupp, NW NW NW 21-10s-28w, dry, TD 4,560 ft.

Thomas County: Wycoff & Williams 1 Chase, NE NE SE 1-9s-33w, dry, TD 4,834 ft.

# Mississippi

## New Wilcox Discovery Completing in Adams

JACKSON.—In southwest Adams County, Mississippi, Humble Oil & Refining Co. is preparing to complete C-1 N. H. Breaux et al Section 11-4n-3w, as a new Wilcox discovery. Casing was set at 6,901 ft. and perforated 6,844-48 ft. with 24 shots. On drill-stem test using ¼-in. chokes the well flowed at the estimated rate of 75 bbl. of oil per day with top pressure 90 psi. At last report tubing was run for potential test and completion.

In Jones County, Mississippi, Gulf Refining Co. was unable to get to bottom with testing tool to test shows of oil in Smackover sand at 13,077-085 ft. in 1 Jones County "F," Section 16-9n-10w, deep test on the Sandersville prospect. Hole was conditioned and 7-in. casing was run to 13,091 ft. and cemented with 182 sacks of cement.

In northeast Pearl River County, Mississippi, approximately 5 miles west of Pistol Ridge field, the Gulf Refining Co. 1 U.S.A. "W" Section 8-1s-14w, recovered 12½-ft. of gray sand with gas odor, taste, and good ether cut out of a core at 12,033-073 ft. The top 23½ ft. and bottom 4 ft. of this core was described as gray and black shale. No attempt was made to drill-stem test this show. Another core was cut at 12,076-103 ft. with recovery being shale and lime with only spotted fluorescence in top 5 ft. Hole was drilled 12,103 to 12,118 ft. and at last report another core was being cut.

Casing has been run in the third test at Hiwannee field, Wayne County, Mississippi, to test good shows of oil. This test, Gulf Refining Co., 1 Chapman-Jones unit "A," Section 19-16n-6w, was cored and drilled to total depth of 9,726 ft. It was reported that log indicated oil sand at 8,900-11, 8,898-9,001, and 9,068-73 ft. in the Lower Cretaceous. It will be recalled that 3,800 ft. of 38°-gravity oil had been recovered on drill-stem of open hole at 9,044-79 ft. This area still appears to be similar to other Lower Cretaceous producing areas in the state. Every test is a wildcat and it is never known whether the sands encountered in previous wells will be present or not.

### MISSISSIPPI WILDCAT FAILURES

Adams County: Dan L. Reynolds 2 Annie L. Brown, Sec. 27-5n-1w, dry, TD 6,865 ft.
Lincoln County: Roeser and Pendleton 1


Coring
Straight hole drilling
Washover
Window cutting
Whip-stocking
Etc.

PROBLEMS solved with

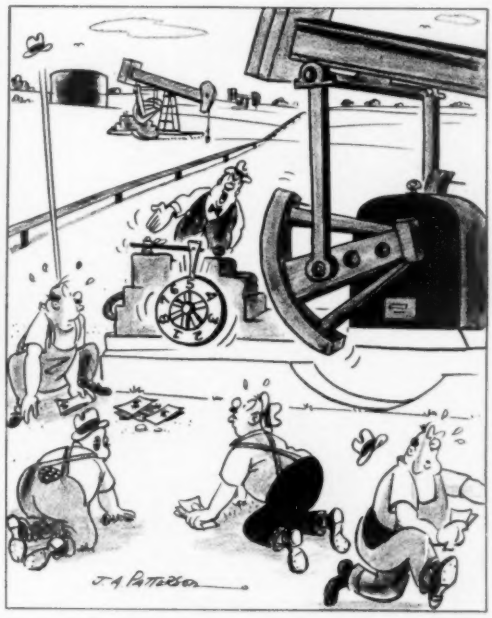
Truco DIAMOND BITS
D&S CORE BARRELS

Drilling & Service

3031 Elm Street Dallas 1, Texas

OFFICE PHONE: Riverside-6811
NIGHT NUMBERS: ELmhurst-6335; Victor 4708

| | | |
|---|---|---|
| Other Offices-Services | Tyler, Texas ..... 2-2742 | Shreveport, La. ..... 5-5474 |
| | Odessa, Texas ..... 6-6774 | Casper, Wyo. ..... 3739 |
| | Abilene, Texas ..... 2-2790 | Carmi, Ill. ..... 7769 |
| | Victoria, Texas ..... 3264 | Ft. Morgan, Colo. ..... 1143 |
| | Norman, Okla. ..... 4360 | Great Bend, Kans. ..... 7995 |
| Distributors | Diamond Drilling Co., 2759 E. Willow St., Long Beach, Calif., Telephone: Long Beach 40-7949 | |
| | Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861 | |
| Foreign | D. T. O'Connor, 500 Fifth Avenue, New York, N. Y. | |
| | Petroleum Industry Consultants, C. A., Caracas, Venezuela | |
| | Denton-Spencer Co., Ltd., Calgary, Alberta, Canada | |


THE OIL AND GAS JOURNAL

**"When you gentlemen get through with your roulette game, come to the office!"**

PERRAULT BROTHERS

FIBERCAST

OIL WELL TUBING

A product of thermo-setting polyester resins reinforced with glass fibers. Resins are cured under the influence of peroxide catalysts, making Fibercast resistant to many solutions which corrode steel tubing. Joined by threaded couplings using our special thread lubricant.

FIBERCAST ADVANTAGES:

- MADE FROM THERMO SETTING RESINS Not to be compared with extruded plastic pipe made with thermo plastic materials.
- CAN BE OPERATED BETWEEN —65 AND 300° F.
- HAS NO ELONGATION, NO COLD FLOW, NON-SHATTERABLE.

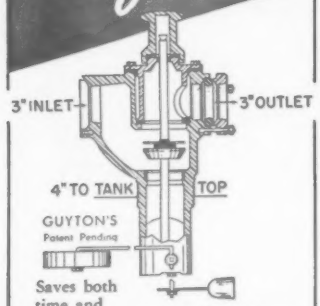
PB FIBERCAST PIPE

PERRAULT Brothers

1130 N. BOSTON • TULSA 6, OKLA.
TELEPHONE 5-1103

Export Office, 30 Rockefeller Plaza
New York 20, N. Y. • Phone Circle 6-6260

STOCK TANK Switching Valve




Saves both time and money on stock tank hook-ups. Poppet type valve is set manually, then it switches flow from tank to tank (or by-passes a tank) automatically. Field proven by many major oil companies. *Write for complete Bulletin.*

MURDOCK
TANK & MFG. CO.
TULSA, OKLAHOMA

J. S. Rawls, Sec. 19-5n-8e, dry, TD 10,897 ft.

**ALABAMA WILDCAT FAILURE**

Mobile County: I. P. La Rue 1 Altmayer-Coggins, Sec. 24-1n-4w, dry, TD 8,075 ft.

**FLORIDA WILDCAT FAILURE**

Okaloosa County: Cecil R. Haden 1 Y. F. McCart, Sec. 30-4n-24w, dry, TD 6,324 ft.

## Appalachian-Ohio

### Rank Wildcat Slated For Somerset County

PITTSBURGH. — In Greenville Township, Somerset County, Southwest Pennsylvania, New York State Natural Gas Corp. announced 1-320 M. V. Newman, rank wildcat. It is on the Frostburg, Maryland, Quadrangle .72 mile south of latitude 39 degrees 45 minutes and 2.38 miles west of longtitude 78 degrees 55 minutes. In Unity Township, Westmoreland County, Peoples Natural Gas Co., located its fifth well in this area. It is 1-4019 A. W. Kintz, elevation 2,066 ft., Donegal Quadrangle 1.22 miles south of latitude 40 degrees 15 minutes and 1.90 miles west of longitude 79 degrees 15 minutes. This company's 4003 A. J. Dotterway, is drilling at 8,340 ft., and 4008 J. R. Frola, at 6,093 ft.

**West Virginia.**—Three new wildcats were reported in West Virginia. In Holly district, Webster County, Blaho Oil & Gas Co. located 1 Hacker Valley Lumber Co., elevation 1,449 ft., Hacker Valley Quadrangle, 2.35 miles south of latitude 38 degrees 40 minutes and 1.65 miles west of longitude 80 degrees 25 minutes. In Huttonsville district, Randolph County, Snee & Eberly are drilling 2 West Virginia of Central, elevation 2,064 ft. It is on the Durbin Quadrangle 3.2 miles south of latitude 38 degrees 45 minutes and 2.5 miles west of longitude 79 degrees 55 minutes. In Middle Fork district, Blaho Oil & Gas Co. announced 1 Dora Brown, elevation 2,548 ft., Sago Quadrangle .95 mile south of latitude 38 degrees 50 minutes and .20 mile west of longitude 80 degrees .05 minutes. Lubeck district, Wood County, Columbian Carbon Co. 1-1181 Frieda S. Somerville, wildcat, elevation 856 ft., resulted in a dry hole, Corniferous lime 4,541 ft., Oriskany sand, 4,644 ft., total depth 4,750 ft. Two good shallow sand gas wells were reported: Magnolia district, Mingo County, Wilkin Oil and Gas Co. completed 1 Thacker Creek Co., resulting in a large natural open flow volume of gas in the Big lime gaging 15,000,000 cu. ft., rock pressure of 800 psi., total depth 2,508 ft.; Center district, Gilmer County, Carnegie Natural Gas Co. 1673 A. D. Cottrill, tested 1,600,000 cu. ft. gas in the Maxson sand, total depth 1,781 ft.

**WEST VIRGINIA WILDCAT FAILURE**

Wood County: Lubeck district: Columbian Carbon Co. 1-1181 Frieda S. Somerville, elevation 856 ft., dry, Corniferous lime 4,541 ft., Oriskany sand 4,644 ft., TD 4,750 ft.

---

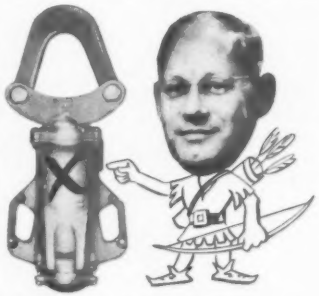
**OHIO**

Pure Oil Co. 1 Russell Roof, Lot 3, New Castle Township, Coshocton County, the first offset to the discovery on Reese in the eastern part of the Township, made 3 bbl. natural from Clinton at 3,223-86 ft. The test was shot with 90 qts. and the oil increased to 75 bbl. in 24 hours. In the same township, Oxford Oil Co. 1 Howard Proper, Lot 22,

NO FUEL WASTE

The INFERNO "Blue Flame" Low Pressure Gas Burner affords important savings on fuel costs by eliminating fuel waste. Used with good results at refineries, gasoline plants and wherever industrial use calls for hard firing at an economical cost. To get details on money-saving INFERNO Low Pressure Gas Burner, write for free copy of Bulletin 13-C.

The INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.



"X" marks the spot...

...where the name of the maker is found on this superior Connector. ★ Looks like "Web Wilson" to me and that's the name to look for if you want a Connector (or Hook) with no load-carrying threads; with the plunger and bearing operating in an oil bath that also provides a controlled hydraulic action for the spring. ★ There are many more features of the Web Wilson Connector you would find outstanding, so why not call H. E. Maland, the "Manhattan Associate" of R. J. Eiche and Associates, at Worth 4-3980; or drop by Room 314 at 30 Church Street. ★ He's ready with all the facts about the world's best Connector-Hook, one of the Web Wilson line of *better* oil tools.

SUPER SERVICE
with
Satin Finish
LINER
MISSION
super service liner with SATIN FINISH*
Mission's exclusive Satin Finish* process gives longer life to both liner and piston. Forged from special alloy steels . . . hardened by electrical induction methods . . . plus a deep file hard case — these Mission manufacturing methods mean "the difference" between quality Mission Satin Finish Liners and ordinary liners.
Always specify Mission Satin Finish Super-Service Liners to your supply store.
* Trade Mark, Registered U. S. Patent Office.
MISSION
MANUFACTURING CO
HOUSTON, TEXAS
Export office: 30 Rockefeller Plaza, New York

Under every known condition, in every part of the oil world, Mission products have earned the confidence of oil men by always delivering top performance. You are sure of getting the best when you specify ***Mission.***

# MISSION MANUFACTURING CO.

HOUSTON, TEXAS

Export office: 30 Rockefeller Plaza, New York

made a showing of oil natural and 55 bbl. in 24 hours after shot. Sand in the well, an outside location to New Castle pool, was reported at 2,975-3,030 ft.

## Central Area

### ILLINOIS

Murvin & Steber Drilling Co. is opening a new McClosky producing area 4 miles southwest of Calhoun, in Richland County, at its 1 J. Murvin, NE NW SE 8-2n-10e, which is being put on the pump following swabbing tests. The well swabbed 154 bbl. during a 15-hour period following acidization. Pay is at 3,193-99 ft. in hole open below 3,190 ft. Total depth is 3,223 ft. The new area is about a mile east of nearest production in the Calhoun Consolidated field.

Nation Oil Co. 1 Westphilinger, SW SW SE 12-8s-9e, ¾ mile from production in the West Inman Consolidated field, Gallatin County, has casing run for production tests of oil showings found in lower Renault lime. A 60-minute drill-stem test at 2,778-84 ft. in that indicated pay zone got 2,700 ft. of gas, 390 ft. of clean oil and 30 ft. of oil-cut mud. McClosky lime, drilled to 2,948 ft., also had showings but a drill-stem test at 2,941-44 ft. in that zone got only 30 ft. of slightly oil and gas-cut mud. Casing was run through the lower Renault to 2,936 ft. The area is 6 miles southwest of New Haven.

Two miles north of New Haven in the SE SE SE 5-7s-10e, southeastern White County, Clark & Clark 1 R. F. Clark has casing run for testing Aux Vases sand, in which a drill-stem test got gas in 35 minutes and recovered 1,945 ft. of clean oil and 240 ft. of oil-cut mud. Total depth is 2,915 ft. Location is a wildcat in the general Concord area.

Swabbing tests at E. A. Obering's new Trenton lime discovery well, 1 Kitowski, NE SE NE 21-3s-2w, southeastern Washington County, on the western side of the Illinois basin, recovered oil at the rate of 10 bbl. per hour after acidization. Pumping equipment is being set for completion. Pay is at 3,900-34 ft. Location, 7 miles southeast of Nashville.

Collins Brothers 1 Jones, NE NW NW 5-2s-9e, a wildcat located 2 miles southwest of Goldengate, in southeastern White County, pumped 50 bbl. of oil in 8 hours while completing in Aux Vases sand at 3,222-49 ft. It is a mile from other production.

### INDIANA

Production of the Mount Vernon Consolidated field in Posey County is being extended ¾ mile southeastward in the area 3 miles southwest of the town of Mount Vernon where Carter Oil Co. is testing good oil and gas showings encountered in its 1 Norton Rowe, E½ NE SW 24-7s-14w. A 4-hour drill-stem in the well's indicated pay zone, lower Renault lime, got gas in 15 minutes and recovered 2,725 ft. of clean oil and 30 ft. of mud-cut oil, virtually assuring completion of a sizable producing well. Pay zone is at 2,913 ft., through which casing was run to 2,990 ft. in hole bottomed at 3,151 ft. in McClosky lime. The well also had showings in Tar Springs sand, logged at 2,298-2,305 ft. and 2,309-15 ft.

L. F. Wilson 1 Happe, SE SE SE 12-7s-13w, a semiwildcat in the Lamott area, 3½ miles east of Mount Vernon, also in Posey County, is a prospective producer in Cypress sand. It recovered 2,340 ft. of clean oil and 40 ft. of mud-cut oil in a 60-minute drill-stem of the latter sand, logged at 2,360-71 ft., and has casing run to the top for completion. No water was indicated.

Hupp & Hume and associates have an indicated O'Hara lime producer for the recently opened Barker pool on the Indiana-Kentucky line, 7 miles south of Evansville. Other wells in the new pool produce from Cypress sand. The prospective O'Hara well is 2 Barker-Preston, SE SE NE 36-7s-11w, on the Indiana side of the line in Vanderburgh County. O'Hara saturation was logged at 2,368-73 ft. A 60-minute drill-stem test at 2,360-80 ft. got gas in 31 minutes and filled 390 ft. of oil and 115 ft. of mud-cut oil. Total depth now is 2,500 ft. with casing cemented on bottom. Good showings were logged in the pool's Cypress pay at 2,070-75 ft. but operators elected to drill ahead for a look at lower potential pay zones.

Ashland Oil & Refining Co. and associates 1 Kissel, SE SE NE 34-2s-10w, 4 miles southeast of Princeton and 2 miles from nearest production in the Francisco area, in Gibson County, is being completed on the pump with initial production of 105 bbl. of oil per day. Pay is Aux Vases sand, opposite which casing is perforated at 1,934-46 ft.

Three miles northeast of Princeton and ½ mile from production Illinois-Mid-Continent Co. 1 James Dunlap, NE SW SW 28-1s-10w, also in Gibson County, swabbed 189 bbl. of oil in the first 24 hours, testing O'Hara lime, a new pay zone for the area. Casing is perforated at 1,876-80 ft.

E. J. Cunningham 1 Wilder, NW NW SE 17-2s-9w, 7 miles east of Princeton and ¾ mile northwest of the East Francisco pool, recovered 420 ft. of clean oil and 30 ft. of mud-cut oil in a 60-minute drill-stem test of Aux Vases sand at 1,719-29 ft., and has casing run to the top of the pay for completion.

### MICHIGAN

A 2,000-gal. acid treatment at Robert W. Devine & J. W. Lang Co. 1 Beroza, NE NE

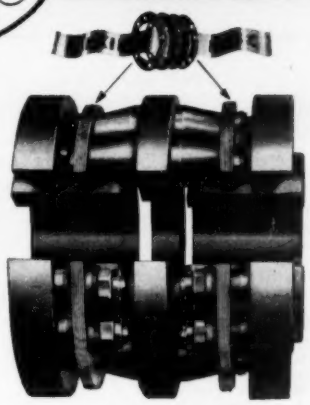
(Continued on page 238)


AVOID COSTLY SHUT-DOWNS!

prolong the life of your machines with Thomas Couplings

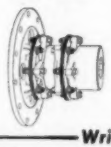
NO MAINTENANCE
NO LUBRICATION
NO BACKLASH
NO WEARING PARTS

THOMAS
THE THOMAS PRINCIPLE
GUARANTEES PERFECT BALANCE
UNDER ALL CONDITIONS
OF MISALIGNMENT



REFINERS! PIPE LINE MEN!
DRILLING ENGINEERS!
LABORATORY TECHNICIANS!

You can use Thomas Couplings to your advantage on Pumps, Compressors, CoolingTowers, Rigs or any tough job where continuous operation and dependability are required.

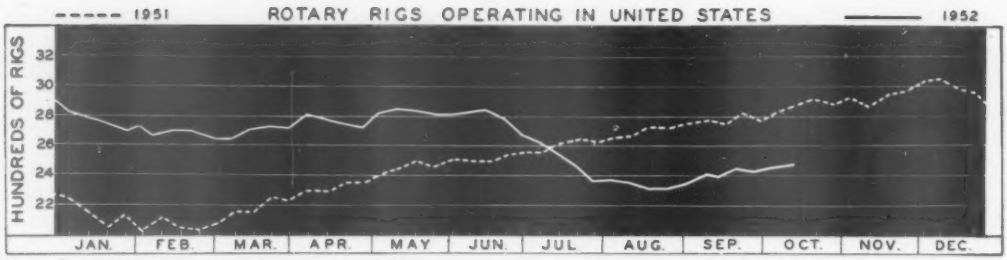


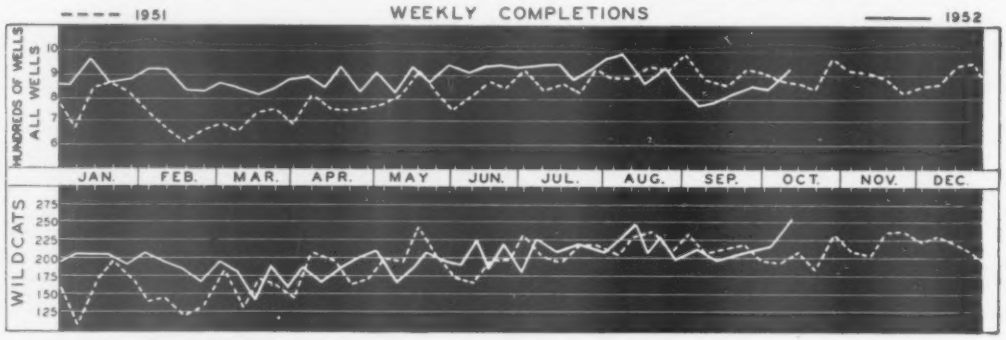
Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

SPEEDS — All Speeds up to 30,000 RPM.
POWER — All Drives up to 40,000 HP.

Write for our new Engineering Catalog No. 51

THOMAS FLEXIBLE COUPLING COMPANY
WARREN, PENNSYLVANIA, U.S.A.



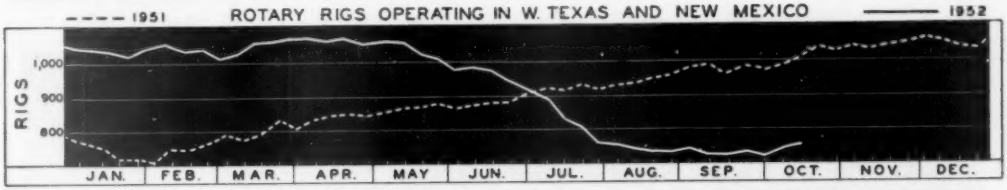

# CURRENT STATISTICS

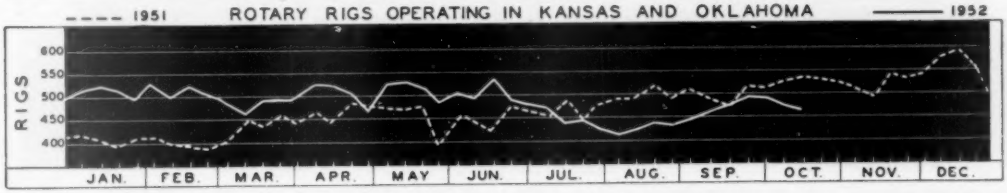
## EXPLORATION

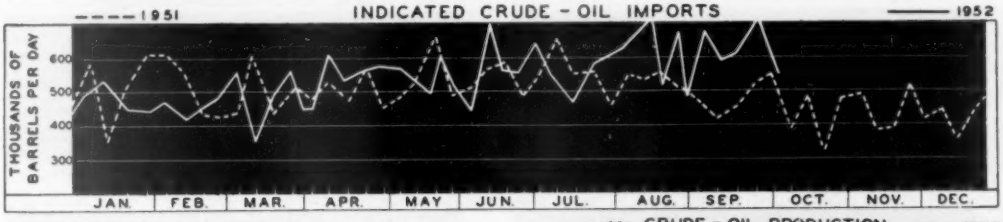
### WEEKLY WELL COMPLETIONS . . . WEEK ENDED OCTOBER 11, 1952

| | Total of all wells | | | | | | | Wildcat completions and discoveries | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Oct. 11 | | | | | | | Cumulative total, 1952 | | | | |
| | Comp. | Oil | Gas | Dry | Footage | 1952 | 1951 | Oil | Dist. | Gas | Dry | Total | Oil | Dist. | Gas | Dry | Total |
| New York | 16 | 8 | 0 | *8 | 23,500 | 609 | 511 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| Pennsylvania | 40 | 21 | 2 | †17 | 67,757 | 1,553 | 1,358 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 |
| West Virginia | 12 | 1 | 8 | 3 | 40,295 | 484 | 489 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 4 | 7 | 11 |
| Ohio | 29 | 9 | 7 | ‡13 | 62,981 | 790 | 756 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 7 | 16 | 25 |
| Indiana | 26 | 4 | 1 | 21 | 41,985 | 988 | 1,078 | 0 | 0 | 0 | 9 | 9 | 28 | 0 | 2 | 282 | 312 |
| Kentucky | 31 | 10 | 6 | 15 | 51,324 | 1,018 | 1,013 | 0 | 0 | 0 | 5 | 5 | 19 | 0 | 1 | 209 | 229 |
| Illinois | 58 | 24 | 1 | 33 | 147,934 | 1,569 | 1,941 | 1 | 0 | 1 | 15 | 17 | 19 | 0 | 1 | 435 | 455 |
| Michigan | 17 | 2 | 0 | 15 | 33,906 | 556 | 605 | 0 | 0 | 0 | 8 | 8 | 22 | 0 | 4 | 190 | 216 |
| Kansas | 87 | 31 | 10 | ‡46 | 286,991 | 3,631 | 3,426 | 3 | 0 | 0 | 15 | 18 | 82 | 0 | 13 | 604 | 699 |
| Nebraska | 17 | 5 | 0 | 12 | 82,343 | 248 | 185 | 0 | 0 | 0 | 12 | 12 | 10 | 0 | 2 | 137 | 149 |
| Oklahoma | 111 | 50 | 4 | §57 | 363,946 | 4,527 | 4,315 | 1 | 0 | 0 | 11 | 12 | 82 | 2 | 11 | 480 | 575 |
| Texas | 288 | 152 | 9 | 127 | 1,448,478 | 13,597 | 13,065 | 25 | 0 | 1 | 93 | 119 | 636 | 44 | 98 | 3,025 | 3,803 |
| North Central (Dist. 7-B & 9) | 91 | 52 | 0 | 39 | 297,156 | 4,272 | 3,948 | 11 | 0 | 0 | 29 | 40 | 350 | 2 | 24 | 1,237 | 1,613 |
| West (Dist. 7-C & 8) | 82 | 57 | 0 | 25 | 536,445 | 4,156 | 3,947 | 6 | 0 | 0 | 20 | 26 | 139 | 1 | 6 | 568 | 714 |
| Panhandle (Dist. 10) | 10 | 5 | 2 | 3 | 37,040 | 528 | 567 | 0 | 0 | 0 | 3 | 3 | 4 | 0 | 7 | 45 | 56 |
| Eastern (Dist. 5 & 6) | 14 | 3 | 0 | 11 | 75,550 | 720 | 967 | 0 | 0 | 0 | 9 | 9 | 16 | 4 | 2 | 182 | 204 |
| Gulf Coast (Dist. 2 & 3) | 41 | 9 | 3 | 29 | 265,221 | 2,046 | 1,818 | 0 | 0 | 1 | 17 | 18 | 63 | 26 | 27 | 447 | 563 |
| Southwest (Dist. 1 & 4) | 50 | 26 | 4 | 20 | 237,066 | 1,875 | 1,818 | 8 | 0 | 0 | 15 | 23 | 64 | 11 | 32 | 546 | 653 |
| Louisiana | 55 | 29 | 7 | 19 | 359,872 | 1,799 | 1,687 | 3 | 0 | 0 | 10 | 13 | 37 | 17 | 11 | 241 | 306 |
| Northern | 32 | 17 | 3 | 12 | 121,424 | 981 | 923 | 2 | 0 | 0 | 7 | 9 | 15 | 0 | 7 | 119 | 141 |
| Southern | 23 | 12 | 4 | 7 | 238,448 | 818 | 764 | 1 | 0 | 0 | 3 | 4 | 22 | 17 | 4 | 122 | 165 |
| Arkansas | 12 | 3 | 0 | 9 | 60,007 | 315 | 324 | 0 | 0 | 0 | 4 | 4 | 6 | 0 | 0 | 70 | 76 |
| Mississippi | 3 | 1 | 0 | 2 | 24,504 | 268 | 282 | 0 | 0 | 0 | 2 | 2 | 14 | 2 | 1 | 123 | 140 |
| Southeastern States | 2 | 0 | 0 | 2 | 14,399 | 52 | 45 | 0 | 0 | 0 | 2 | 2 | 3 | 0 | 1 | 28 | 32 |
| Montana | 13 | 4 | 1 | 8 | 65,146 | 253 | 176 | 1 | 0 | 0 | 5 | 6 | 6 | 0 | 1 | 64 | 71 |
| Wyoming | 12 | 7 | 0 | 5 | 45,336 | 531 | 583 | 1 | 0 | 0 | 4 | 5 | 20 | 0 | 3 | 98 | 121 |
| Colorado-Utah | 16 | 4 | 3 | 9 | 90,627 | 410 | 233 | 0 | 0 | 0 | 7 | 7 | 17 | 0 | 8 | 170 | 195 |
| New Mexico | 24 | 14 | 8 | 2 | 136,027 | 816 | 528 | 4 | 0 | 0 | 0 | 4 | 33 | 2 | 1 | 80 | 116 |
| California | 50 | 42 | 1 | 7 | 181,797 | 1,916 | 1,813 | 1 | 0 | 1 | 6 | 8 | 61 | 0 | 6 | 388 | 455 |
| North Dakota | 2 | 1 | 0 | 1 | 11,195 | 77 | 3 | 0 | 0 | 0 | 1 | 1 | 4 | 0 | 0 | 20 | 24 |
| Miscellaneous (Mo.) | 2 | 0 | 1 | 1 | 1,212 | 58 | 81 | 0 | 0 | 1 | 1 | 2 | 0 | 0 | 21 | 24 | 45 |
| Total United States | 923 | 422 | 69 | 432 | 3,641,562 | 36,065 | 34,497 | 40 | 0 | 4 | 211 | 255 | 1,101 | 67 | 196 | 6,695 | 8,059 |
| Total previous week | 845 | 416 | 55 | 374 | 3,413,861 | | | 29 | 1 | 6 | 183 | 219 | 1,061 | 67 | 192 | 6,484 | 7,804 |
| Total October 13, 1951 | 880 | 440 | 72 | 368 | 3,509,443 | | | 29 | 3 | 4 | 172 | 208 | 1,175 | 64 | 196 | 6,239 | 7,674 |

Service wells included: *8, †15, ‡2, §8.



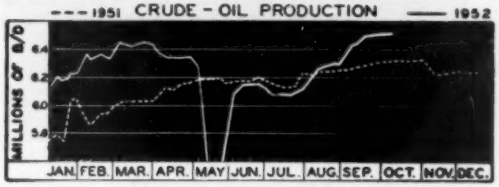



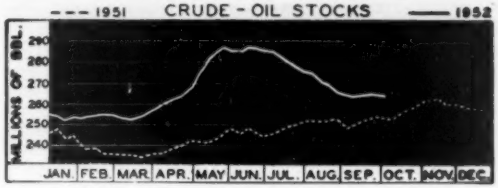




## DAILY AVERAGE PRODUCTION FOR WEEK

| | October 11, 1952 | | | Oct. 4 |
|---|---|---|---|---|
| | Crude oil | Lease condensate | Total | total |
| Alabama | 3,100 | | 3,100 | 3,000 |
| Arkansas | 74,450 | 600 | 75,050 | 75,400 |
| California | 982,100 | | 982,100 | 983,500 |
| Colorado | 87,500 | | 87,500 | 85,800 |
| Eastern | 58,500 | | 58,500 | 58,500 |
| Florida | 1,600 | | 1,600 | 1,600 |
| Illinois | 166,200 | | 166,200 | 168,200 |
| Indiana | 34,300 | | 34,300 | 35,200 |
| Kansas | 331,700 | | 331,700 | 338,400 |
| Kentucky | 31,000 | | 31,000 | 31,100 |
| Louisiana | 643,425 | 27,400 | 670,825 | 670,025 |
| North | 109,700 | 1,900 | 111,600 | 111,750 |
| South | 533,725 | 25,500 | 559,225 | 558,275 |
| Michigan | 34,100 | | 34,100 | 33,800 |
| Mississippi | 91,600 | 3,500 | 95,100 | 95,300 |
| Montana | 26,500 | | 26,500 | 26,200 |
| Nebraska | 8,200 | | 8,200 | 7,900 |
| New Mexico | 171,750 | 400 | 172,150 | 169,025 |
| Oklahoma | 528,700 | | 528,700 | 533,100 |
| Texas | 2,960,000 | 42,450 | 3,002,450 | 2,990,625 |
| Dist. 1 | 37,100 | 200 | 37,300 | 36,450 |
| Dist. 2 | 169,700 | 4,000 | 173,700 | 173,600 |
| Dist. 3 | 485,100 | 23,400 | 508,500 | 505,625 |
| Dist. 4 | 272,275 | 5,000 | 277,275 | 275,325 |
| Dist. 5 | 51,525 | 250 | 51,775 | 51,125 |
| Dist. 6 | 127,850 | 3,600 | 131,450 | 129,800 |
| E. Texas field | 249,000 | | 249,000 | 258,650 |
| Dist. 7-B | 110,850 | 75 | 110,925 | 108,300 |
| Dist. 7-C | 172,750 | 5,400 | 178,150 | 176,400 |
| Dist. 8 | 1,015,025 | 225 | 1,015,250 | 1,007,725 |
| Dist. 9 | 186,500 | 275 | 186,775 | 185,200 |
| Dist. 10 | 82,325 | 25 | 82,350 | 82,425 |
| Utah | 5,000 | | 5,000 | 5,000 |
| Wyoming | 195,000 | | 195,000 | 195,000 |
| North Dakota | 3,700 | | 3,700 | 3,500 |
| Total U. S. | 6,438,425 | 74,350 | 6,512,775 | 6,510,175 |
| Change from previous week, up | | | 2,600 | |
| Canada | 182,625 | | 182,625 | 202,125 |
| Total U. S. production January 1-October 11 | | | 1,755,226,050 bbl. | |
| Same period last year (crude plus cond) | | | *1,744,158,250 bbl. | |

*Incl. 23,143,500 bbl. condensate.



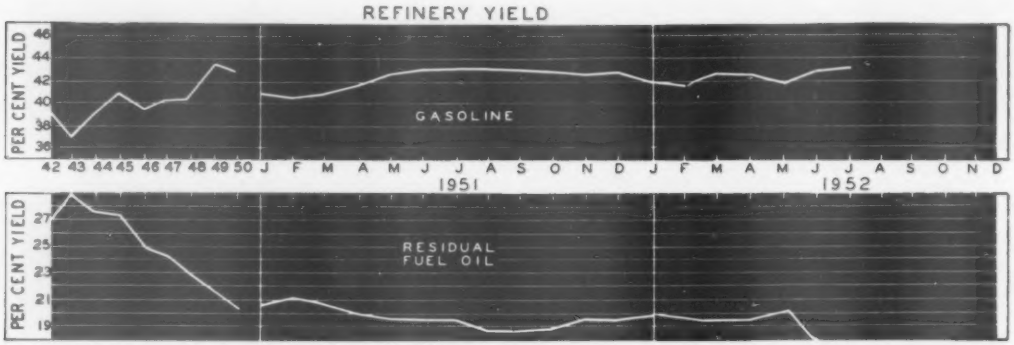



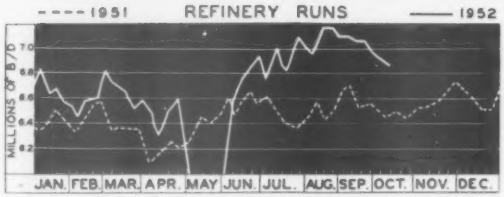

## CRUDE-OIL STOCKS BY STATES OF ORIGIN*

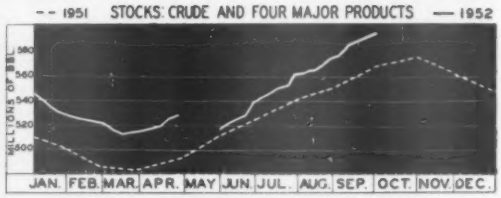
(Thousands of barrels)

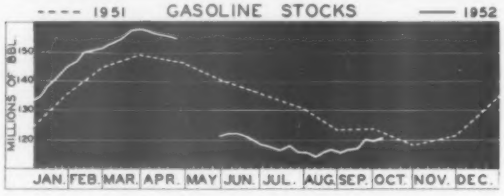
| | Oct. 4, '52 | Sept. 27, '52 | Oct. 6, '51 |
|---|---|---|---|
| Pennsylvania Grade | 2,201 | 2,208 | 1,996 |
| Other Appalachian | 2,022 | 2,285 | 2,353 |
| Illinois, Indiana, Michigan | 12,166 | 12,031 | 12,665 |
| Arkansas | 3,009 | 3,031 | 2,647 |
| Louisiana | 15,660 | 16,319 | 14,966 |
| North | 2,390 | 2,324 | 2,748 |
| Gulf | 13,270 | 13,995 | 12,218 |
| Mississippi | 3,428 | 3,462 | 3,245 |
| New Mexico | 7,360 | 7,468 | 6,993 |
| Oklahoma and Kansas | 38,194 | 38,288 | 38,350 |
| Texas | 128,324 | 128,254 | 121,818 |
| East Texas proper | 12,310 | 13,371 | (†) |
| West Texas | 58,102 | 57,863 | (†) |
| Texas Gulf | 27,440 | 26,611 | (†) |
| Other Texas | 30,472 | 30,409 | (†) |
| Rocky Mountain | 14,503 | 14,423 | 13,488 |
| California | 30,529 | 30,767 | 29,313 |
| Foreign | 6,757 | 7,365 | 6,201 |
| Total | 264,153 | 265,901 | 254,035 |

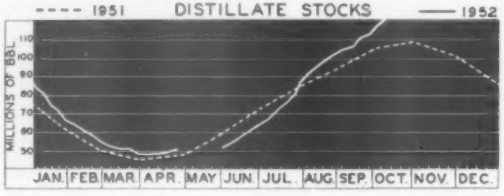
*Bureau of Mines. †Not comparable with current week.

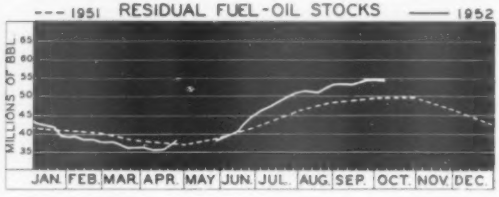

REFINERY YIELD
PER CENT YIELD
GASOLINE
42 43 44 45 46 47 48 49 50 J F M A M J J A S O N D J F M A M J J A S O N D
1951
1952
PER CENT YIELD
RESIDUAL FUEL OIL





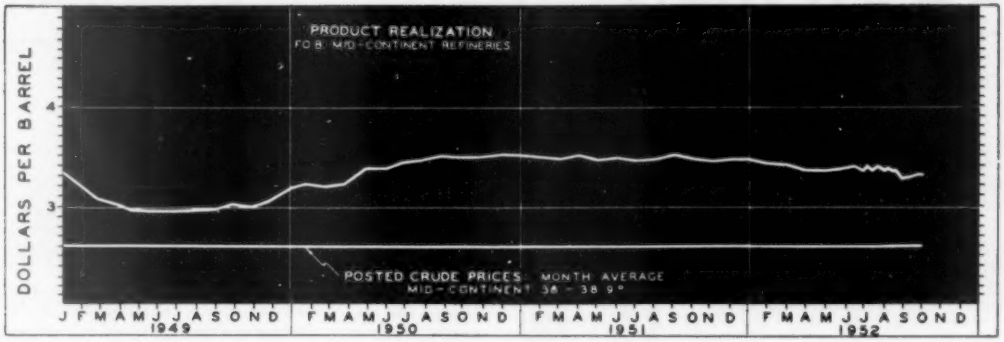




## A.P.I. REFINERY REPORT, OCTOBER 11

(Thousand of barrels)

| District— | Daily avg. runs | Daily average production Gaso.* | Kero. | Dist. | Resid. | Stocks‡ Gaso.† | Kero. | Dist. | Resid. | Bureau of Mines, October 1951 Daily avg. runs | Daily average production Gaso.* | Kero. | Dist. | Resid. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| East Coast | 1,015 | 391.7 | 64.3 | 228.0 | 210.1 | 30,055 | 15,654 | 43,636 | 11,863 | 975 | 391.9 | 39.5 | 252.8 | 211.2 |
| Appalachian: | | | | | | | | | | | | | | |
| District 1 | 109 | 48.0 | 6.0 | 11.9 | 14.7 | 3,712 | 594 | 1,595 | 844 | 103 | 42.8 | 5.3 | 16.4 | 10.4 |
| District 2 | 77 | 40.9 | 5.8 | 12.9 | 11.3 | 1,674 | 313 | 615 | 441 | 75 | 36.8 | 4.7 | 9.6 | 16.6 |
| Ind., Ill., Ky. | 1,214 | 675.1 | 77.6 | 225.7 | 156.0 | 25,287 | 7,788 | 23,465 | 6,976 | 1,152 | 624.3 | 70.8 | 190.6 | 172.2 |
| Okla., Kans., Mo. | 587 | 325.9 | 11.3 | 145.8 | 57.9 | 11,322 | 2,169 | 13,837 | 1,584 | 539 | 286.2 | 16.9 | 132.4 | 61.9 |
| Inland Texas | 249 | 177.0 | 12.7 | 44.1 | 37.4 | 4,055 | 463 | 2,467 | 1,202 | 260 | 183.7 | 12.7 | 39.7 | 41.0 |
| Texas Gulf Coast | 1,772 | 809.9 | 123.1 | 418.6 | 274.7 | 18,240 | 4,061 | 13,452 | 8,726 | 1,569 | 740.6 | 126.3 | 336.7 | 249.1 |
| La. Gulf Coast | 529 | 256.6 | 63.6 | 126.3 | 46.4 | 6,414 | 3,001 | 5,414 | 1,846 | 519 | 243.9 | 65.4 | 119.3 | 57.7 |
| N. La. and Ark. | 79 | 34.1 | 5.9 | 15.8 | 7.4 | 2,697 | 666 | 1,029 | 279 | 81 | 32.4 | 7.1 | 16.9 | 6.3 |
| Rocky Mountain: | | | | | | | | | | | | | | |
| New Mexico | 18 | 10.4 | | 2.9 | 3.9 | 95 | | 68 | 121 | 17 | 9.9 | 0.5 | 2.5 | 3.9 |
| Other Rocky Mtn. | 238 | 111.3 | 6.1 | 43.3 | 40.9 | 3,129 | 485 | 2,354 | 1,225 | 186 | 90.9 | 6.7 | 35.3 | 39.7 |
| California | 967 | 409.4 | 0.7 | 166.7 | 309.0 | 14,230 | 335 | 12,144 | 19,316 | 970 | 421.8 | 7.4 | 143.3 | 354.0 |
| October 11, 1952 | 6,854 | 3,290.3 | 377.1 | 1,442.0 | 1,169.7 | 120,910 | 35,529 | 120,076 | 54,423 | 6,446 | 3,105.2 | 363.3 | 1,295.5 | 1,224.0 |
| October 4, 1952 | 6,928 | 3,350.1 | 370.7 | 1,489.0 | 1,280.9 | 119,793 | 35,212 | 118,078 | 54,617 | | | | | |
| October 13, 1951 | 6,426 | 3,047.1 | 348.1 | 1,257.0 | 1,199.4 | 121,895 | 36,007 | 107,224 | 50,378 | | | | | |

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipe lines.


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
DOLLARS PER BARREL
4
3
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
J F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951
F M A M J J A S O N D
1952

**In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate and fuel oil. Realization averaged $3.32 for week ended October 4, $3.33 for previous week, and $3.49 for October 1951. The above trend information is based on volumes and current prices and therefore does not reflect changes in operating costs.**

## REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of October 15, 1952. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

### GASOLINE, KEROSINE, AND FUEL OILS

| | Mid-Continent Group 3 | New York Harbor (barge) | Texas Gulf Coast |
|---|---|---|---|
| Regular gasoline, 80-82 octane | 10⅜-10½ | 12.125-12.75 | 10¾-11 |
| Premium gasoline, 86-88 octane | 11⅜-11½ | 13.25-14.0 | 11¾-12 |
| 42-44 w.w. kerosine | 8¾-9 | 10.4-10.65 | 9 |
| No. 2 straw fuel oil | 7⅝-8 | 9.4-9.65 | 8-8.25 |
| No. 6 residual | $0.85-1.00 | $2.00-2.25 | $1.50-1.75 |

### NATURAL GASOLINE

| | Group 3 | North Texas | N. La. |
|---|---|---|---|
| Grade 26-70 | 6⅞ | 6⅜ | 6⅝ |
| Grade 18-55 | 8.25 | 7.75 | 8.0 |

### LUBRICATING OILS

**South Texas**

| | |
|---|---|
| 200 vis., No. 2-3 neutral | 13-13.5 |
| 750 vis., No. 3-4 neutral | 16 |
| 2,000 No. 5-6 neutral | 18-19 |

### LUBRICATING OILS

**Mid-Continent**

| | |
|---|---|
| 150-160 vis., D bright stock, 0-10 pp. | 26-27 |
| 200 vis., No. 3 neutral, 0-10 pp. | 14-15 |

**Western Pennsylvania**

| | |
|---|---|
| 145-155 vis., 10 p.t. bright stock | 32.5 |
| 180 vis., 0 p.t. neutral | 31.5 |

### WAX

**Mid-Continent**

| | |
|---|---|
| 132-134 A.M.P. | 5.5 |

THE slight note of optimism from suppliers in the Mid-Continent area seems to be due to fact that they have been able to find storage space for enough of their distillate fuels to prevent any decided break in the distillate market and to the probability that they will be able to hang on if early winter weather is near normal.

For the country as a whole, the situation has been helped by the reduction in refinery runs. Refineries operated at better than 7,000,000 bbl. daily for a 6-week period ended September 20 with a peak week at 7,177,000 bbl. daily for week ended August 16. Runs dropped to 6,987,000 bbl. daily for week ended September 27 and to 6,928,000 bbl. daily for week ended October 4.

Even with reduced runs for recent weeks, production of distillates has remained above 10,000,000 bbl. per week. Distillate production for the past 13 weeks has averaged as much as production during December, January, and February in the middle of last winter.

Residual-fuel demand has increased since the end of the steel strike but the gain has not been large enough to prevent further accumulation of inventories. Residual stocks are now about 5,000,000 bbl. greater than last year.

Some distress residual has been reported from time to time on all markets except the West Coast. A large Mid-Continent supplier is reported to have moved some residual with 2 per cent sulfur at 70 cents a barrel for resale. Good heavy fuel can be found at 85 cents but refiners are not pushing it on the market even at this price.

The slowing up of gasoline demand is indicated by the decrease in movement by tank cars and the availability of pipe-line gasoline at prices slightly under normal. A few local gasoline price wars have been reported, but these are not proof of a general softening of the gasoline market. These wars are present except in times of actual shortage.

## CRUDE PRICES

### GRAVITY SCHEDULE

| | Signal Hill, Calif.‡ | Oklahoma, Kansas | Gulf Coast Tex.* | West Tex.† |
|---|---|---|---|---|
| 18-18.9 | $1.93 | .... | .... | .... |
| 19-19.9 | 1.98 | .... | .... | .... |
| 20-20.9 | 2.03 | $2.25 | .... | $2.12 |
| 21-21.9 | 2.07 | 2.27 | .... | 2.14 |
| 22-22.9 | 2.12 | 2.29 | .... | 2.16 |
| 23-23.9 | 2.18 | 2.31 | .... | 2.18 |
| 24-24.9 | 2.24 | 2.33 | $2.56 | 2.20 |
| 25-25.9 | 2.30 | 2.35 | 2.58 | 2.22 |
| 26-26.9 | 2.36 | 2.37 | 2.60 | 2.24 |
| 27-27.9 | 2.41 | 2.39 | 2.62 | 2.26 |
| 28-28.9 | 2.46 | 2.41 | 2.64 | 2.28 |
| 29-29.9 | 2.52 | 2.43 | 2.66 | 2.30 |
| 30-30.9 | 2.57 | 2.45 | 2.68 | 2.32 |
| 31-31.9 | 2.62 | 2.47 | 2.70 | 2.34 |
| 32-32.9 | 2.68 | 2.49 | 2.72 | 2.36 |
| 33-33.9 | .... | 2.51 | 2.74 | 2.38 |
| 34-34.9 | .... | 2.53 | 2.76 | 2.40 |
| 35-35.9 | .... | 2.55 | 2.78 | 2.42 |
| 36-36.9 | .... | 2.57 | 2.80 | 2.44 |
| 37-37.9 | .... | 2.59 | 2.82 | 2.46 |
| 38-38.9 | .... | 2.61 | 2.84 | 2.48 |
| 39-39.9 | .... | 2.63 | 2.86 | 2.50 |
| 40 and above | .... | 2.65 | 2.88 | 2.52 |

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico.

Last general price change represented a 50-cent increase, effective December 6, 1947.

‡Standard Oil Co. of California.

## FLAT CRUDE PRICES

| | |
|---|---|
| Representative posted schedules per barrel. | |
| Kettleman Hills, California* | $2.80 |
| Louisiana: | |
| Beauregard Parish | 2.60 |
| Cotton Valley (distillate) | 2.85 |
| Cotton Valley (crude) | 2.70 |
| Texas: | |
| East Texas | 2.65 |
| Pecos County (Yates) | 2.35 |
| Conroe | 2.83 |
| Van | 2.48 |
| Pennsylvania Grade: | |
| Bradford | 4.25 |
| Southwest Pennsylvania | 3.82 |
| West Virginia | 3.76 |
| Illinois Basin | 2.77 |

*37°-37.9°.

# EQUIPMENT MEN . . . in the News

## Duff-Norton Names Webb To Board of Directors

E. M. Webb, vice president and general manager of Duff-Norton Manufacturing Co., Pittsburgh, has been elected a member of the board of directors.

Webb has been associated with Duff-Norton for 28 years, having started with the company shortly following graduation from the University of Cincinnati as a mechanical engineer.

## Foster Is Named to New Post by Cummins Engine

C. B. FOSTER

C. B. (Charlie) Foster has been appointed to the newly created position of engines-sales manager for Cummins Engine Co., Inc., Columbus, Ind., according to an announcement by C. R. Boll, general sales manager. In his new capacity, Foster will continue to be in charge of all government-contract work.

Foster joined the company in 1950 as national-accounts representative. In 1951 he was appointed manager of contract sales. Immediately prior to joining Cummins, Foster was assistant to the operating vice president of Truax-Traer Coal Co. He formerly was assistant to the vice president in charge of sales for Bucyrus-Erie Co.

## Big Four Machine Expands Operations

Big Four Machine & Supply Co. has announced an expansion of its operations, including the opening of a complete warehouse at Oklahoma City. General offices, recently opened at Oklahoma City, have also been moved to the new warehouse location, according to John R. Riley, president.

The new warehouse facilities will house complete stocks of the products manufactured by Big Four as well as Beaver Tool & Machine Co. of Maysville, Okla., a Big Four subsidiary.

Big Four, a pioneer in the manufacture of a specialized group of oil field tools and equipment, has manufacturing plants at Clay City, Ill., and Pawhuska, Okla. Products of the company include long sweep ells, slim hole swivels, high-pressure fittings, goosenecks, suction strainers, slim hole rotary tables, long drill collars, and traveling blocks and hooks.

## Holt Advanced to Vice Presidency at Bowser, Inc.

R. L. HOLT

The appointment of Robert L. Holt as vice president of Bowser, Inc., was recently announced by R. Hosken Damon, Bowser president and board chairman.

Holt has been on the company's board of directors for the past 2½ years, and on the finance committee for the past year and a half. Prior to his present appointment, Holt was vice president of H. M. Byllesby & Co. of Chicago. Before becoming associated with this firm Holt was vice president of Blair, Rollins & Co., Inc., Chicago.

## Tube Turns Acquires Kerotest Stock

Arrangements have been completed for the acquisition of all of the common stock of Kerotest Manufacturing Co., Pittsburgh, by Tube Turns, Inc., of Louisville, Ky. The new management will take over operation of the plant immediately.

Kerotest Manufacturing Co. will continue to be operated under its own name and present officers and personnel have been retained.

New officers will be George O. Boomer, chairman of the board; John G. Seiler, vice president; Robert J. Landolt, vice president, all of Tube Turns, Inc. Walter G. Swaney, incumbent vice president and secretary, and J. D. Isaacks, vice president of Kerotest, remain in the same capacity. The presidency will be filled at a later date.

The board of directors will consist of Messrs. Boomer, Seiler, and Landolt of Tube Turns, and John D. Dupuis, and R. W. Mueller, Sr., of the former Kerotest board.

## Security Engineering Begins Operation in New Plant

Security Engineering Co.'s new plant at Dallas.

Early in October Security Engineering's new plant at Dallas started partial operation. However, according to Otto Hammer, president, it will be several months before plant operation will reach top level production.

The plant covers 62,000 sq. ft. and is designed to permit additional plant expansion as needed. The office portion of the structure is completely air conditioned and houses accounting, engineering, metallurgical, and laboratory operations.

The plant, located on a 20-acre site, involves an investment of nearly $2,000,000, and will employ approximately 300 people. Machine tools used in the plant are of the latest and most modern design, and have been carefully selected to meet the specific production requirements of the firm. The plant contains a heat-treating department which is equipped with the latest-type electric furnaces regulated by automatic recording-control panels.

The Dallas plant will be devoted exclusively to the manufacture of three-cutter rock bits. Security's Whittier plant will continue to manufacture cross-section rock bits, reamers, reamer rock bits, hole openers, casing scrapers, and Securaloy production equipment. It is also anticipated that two-cutter and three-cutter bits for the California market will be manufactured there.

## Halliburton Builds Technical Center

**Halliburton Oil Well Cementing Co. officials inspecting the site of the firm's technical center at Duncan, Okla., are: John Guest, chief engineer; Frank Hogwood, architect; Logan D. Campbell, vice president and secretary-treasurer; W. R. McClendon, president, and R. M. (Dick) Hansen, coordinator. In background are Halliburton Plant 2 buildings.**

Work began in early September on Halliburton Oil Well Cementing Co.'s new technical center at Duncan, Okla., according to W. R. McClendon, president.

The 6-acre technical center will house Halliburton's engineering, laboratory, and research facilities. Over 100 engineers, chemists, and other technical personnel will transfer to the center when it is completed about June 1, 1953.

First-floor rooms of the new center include electrical engineering, bulk cement engineering, cement - Hydrafrac laboratories, and administration offices. The second floor will have organic and analytical chemistry laboratories, conference rooms, technical library, general engineering, and physical chemistry laboratories.

## Westinghouse Air Brake Co. Buys Interest in Le Roi Co.

E. O. Boshell, president and chairman of the board of Westinghouse Air Brake Co., Wilmerding, Pa.; W. C. Buchanan, chairman of the board of Le Roi Co., Milwaukee, and T. O. Liebscher, president of Le Roi, recently announced that Westinghouse Air Brake Co. has purchased a majority interest in Le Roi Co.

Le Roi Co., manufacturer of engines, portable compressors, and rock drills, was founded in 1916. It has 1,500 employes in its three divisions at Milwaukee, Cleveland, and Greenwich, Ohio.

According to Boshell, the acquisition of Le Roi Co. adds appreciably to the enlargement of the compressor products of Westinghouse Air Brake Co., and the company will retain the name, organization, officers, employes, plant locations and operations of Le Roi Co.

## Goodall Rubber Names Two Export Representatives

Goodall Rubber Co. of Texas has announced the appointment of two export representatives for Goodall long-life rotary hose.

Petroleum Rubber Supplies, Ltd., has been appointed representative in Canada. W. B. Smith is president of the company, which has offices at 4002 Macleod Trail, Calgary, Alta., Canada.

Joesph R. Tomlinson has been named Mexico City representative. His office is at Paseo de la Reforma 1-860, Mexico City, D. F.

## Hydrocarbon Reaches Agreement with German Firm

Hydrocarbon Research, Inc., of New York has announced the establishment of a cooperative undertaking with Edeleanu Gesellschaft, M. B. H., of Frankfurt, Germany, whereby solvent-refining plants incorporating the latest process developments of Edeleanu and Hydrocarbon will be offered to petroleum refiners.

Emphasis will be placed on the design of plants for the production of paraffinic feed stocks for catalytic cracking, and of high-quality burning oils and fuels.

## Graver Tank Transfers Ohio District Sales Office

Graver Tank & Manufacturing Co., Inc., East Chicago, Ind., has announced the transfer of its Ohio district sales office from Cincinnati to 1101 Hippodrome Building, Cleveland. This district office is under the management of Dwight R. Rhoades.

## M. C. Forbes Acquires Control of Aquatrol, Inc.

R. O. JOHNSON

By purchase of a large block of outstanding stock from other interests, M. C. Forbes, president of Aquatrol, Inc., has secured control of the company, according to a recent company announcement.

Forbes continues as president and technical director of Aquatrol. J. W. Butler has been made a vice president, and C. J. D. Wade, comptroller of the company for a number of years, has been elevated to secretary and treasurer. These officers, with George M. Keith, and B. B. Forbes comprise the new board of directors.

M. C. FORBES

C. J. D. WADE

G. M. KEITH

J. P. TOGNETTY

Keith has been promoted to division engineer in charge of Aquatrol's Gulf Coast division, which includes the company's Houston, Corpus Christi, and New Orleans territories. Keith was previously Aquatrol's resident engineer of the Houston territory for 2 years, and before that he held the same position in their Corpus Christi territory for 2 years.

John P. Tognetty joins the company's Houston office as service director in charge of customer technical services. He was formerly with E. W. Saybolt & Co., referee petroleum testers, for 3 years.

R. O. Johnson, Aquatrol's resident engineer for 2 years in its Corpus Christi territory, has been transferred to Tulsa, and promoted to division engineer in charge of the Mid-Continent division, comprising the Okla-

homa, West Texas, Kansas, and Arkansas territories.

Patrick E. Griffin has been appointed resident engineer in the Los Angeles territory of Aquatrol's West Coast division. Griffin was formerly with the general chemical division of Allied Chemical & Dye Corp., in its Chicago office.

## Standard Magnesium Unit Purchased by M. J. Crose

The M. J. Crose Manufacturing Co., Inc., recently purchased manufacturing facilities and plant of Standard Magnesium Corp., Tulsa. The new plant will be known as the Standard Magnesium division of the Crose company.

According to D. M. Curran, operations for the new plant will begin in early October, and all types of magnesium anodes to cathodically protect buried and marine metal structures will be manufactured. The new plant will also have complete facilities to make special sizes and shapes of magnesium anodes.

Hartley Davis has been named manager of Standard Magnesium division. Sale and installation of anodes to the pipe-line industry will be handled by Pipeline Anode Corp. Yale Titterington, formerly with Dow Chemical Co., is sales manager.

Hugh Brady is chief engineer for Pipeline Anode Corp., as well as head of the engineering and installation phase of the firm.

## National Supply To Promote Lister Engines in U. S.

The National Supply Co. has announced that it is now sole distributor within the Continental United States for Lister diesel engines, manufactured by R. A. Lister & Co., Ltd., Dursley, Gloucestershire, England.

Arrangements to this effect were made following a recent visit to the United States by Sir Percy Lister, chairman of R. A. Lister & Co., Ltd., and a subsequent visit to England by F. Howard Kilberry, general manager of National Supply's engine division, Springfield, Ohio.

National will promote the sale of Lister engines in addition to its own Superior and Atlas engines, replacing Lister-Blackstone, Inc., New York City, as United States distributor. Lister-Blackstone will continue to handle Lister engine sales in Canada.

Most of the Lister engines dealers in the United States will be retained. In addition, Lister engines will be marketed by sales offices of National Supply's engine division.

## Los Angeles Nomads Induct New Members

**New members and induction team members at the preinduction ceremonies at the September meeting of Los Angeles Chapter of Nomads are: standing, J. D. Hughes, Lane-Wells Co.; Floyd C. Cummings, Axelson Manufacturing Co.; Hi Cassidy, The McCarty Co.; W. F. Bettis, Johnston Testers, Inc. Seated: Thad Randolph, Oil Base, Inc.; Glenn Pitts, Republic Supply Co.; H. J. Hagn, Chiksan Co.; Frank L. Tooley, Baash-Ross Tool Co.; Elmer J. Weis, Pacific Pumps, Inc. Men with signs on their heads are the initiates.**

## Schlumberger Opens New Headquarters at Sidney, Neb.

New headquarters of the Sidney, Neb., office of Schlumberger Well Surveying Corp. were recently opened.

Schlumberger opened operations in Sidney City Auditorium in June 1950, with one truck and two employes, including Al Phares, Sidney district manager. Drilling operations have necessitated the addition of more trucks and personnel until the Sidney office now has 22 employes and four trucks.

The new offices were dedicated at an open house attended by officials of Schlumberger and representatives, officials, and employes from local oil companies.

**IN ATTENDANCE at the opening of the new Sidney, Neb., offices of Schlumberger Well Surveying Corp. were: Ed Stewart, division manager, Ohio Oil Co.; A. O. Phares, district manager, Schlumberger, Sidney; and Paul Chabas, area manager, Schlumberger, Denver.**

## Rockwell Names Dixon as Division Vice President

**L. A. DIXON, JR.**

W. F. Rockwell, Jr., president of Rockwell Manufacturing Co., has announced the appointment of L. A. Dixon, Jr., as vice president of the company's meter and valve division. Dixon will coordinate the sale and manufacture of gas, water, and oil meters, gas-pressure regulators, and Nordstrom valves.

Dixon has a long relationship with the meter industry, having devoted his full time to it after graduating from Pennsylvania State College. Shortly thereafter he was commissioned by the U. S. Department of Commerce to make a detailed report of German, French, and English meter methods and designs. He later made a similar survey throughout South America.

Dixon started in the engineering department of Pittsburgh-Dubois Co. and in 1944 was made executive vice president. When Rockwell acquired that company in 1947 he became general manager. He later transferred to the parent company headquarters in Pittsburgh, and prior to his recent promotion served as assistant vice president of the company's meter and valve division.

## H. K. Porter Co. Acquires Watson-Stillman Co.

In a move to further diversify its manufacturing operations, H. K. Porter Co., Inc., Pittsburgh, recently acquired Watson-Stillman Co., Roselle, N. J., T. M. Evans, president of Porter, reported.

Watson - Stillman manufactures a complete line of forged-steel fittings, hydraulic presses, jacks, pumps, shears, pipe benders, and other hydraulic equipment for industry, railroads, and oil and gas fields. Operations at Watson-Stillman will continue under the direction of Edwin A. Stillman, president. Watson - Stillman fittings division will be operated as a division of H. K. Porter Co.

In little more than 2 years, Porter has expanded its operations into rubber, steel, electrical equipment, and forged-steel fittings by acquiring Quaker Rubber Corp., Connors Steel Co., Buffalo Steel Co., Delta-Star Electric Co., and Watson-Stillman.

## Franks Will Produce Three Technicolor Films

Three technicolor sound films are being produced for Franks Manufacturing Corp., Tulsa, to demonstrate its new 1953 models of portable well-servicing and workover units, according to Carl White, Jr., Franks president.

The first film to be completed, "The Cruiser Story," includes shots of many West Texas well-servicing contractors participating in a barbecue which was held for them at Odessa, Tex.

In order to get actual films of units in operation, cameramen have been flown to various fields near Franks' district sales and service offices in Alice and Houston, Tex.; Compton, Calif.; Casper, Wyo.; Seminole, Okla., and Edmonton, Alta., Canada, as well as Odessa. Pictures of the Franks plant in Tulsa are also included in the films.

White announced that "The Cruiser Story" will be shown at the Permian Basin Oil Show in Odessa. European audiences will also view the film during White's tour to England and Europe later this fall.

Similar films on Franks "Rocket" and "Comet" lines are still in production.

## New Plant Site Purchased By Metal Goods Corp.

R. E. Grote, president of Metal Goods Corp., recently revealed the purchase of 17 acres of land to be used for a new plant site in St. Louis. Plans are in the making to erect a two-story general office, covering 50,000 sq. ft. Directly behind the general-office building a large and modern warehouse will be constructed covering 150,000 to 175,000 sq. ft.

This warehouse will contain modern equipment for handling large stocks of aluminum, steel, stainless steel, brass, copper, fittings, fastenings, and various other ferrous and nonferrous metals.

Until the new buildings are completed, Metal Goods will continue to operate from its present location at 5239 Brown Ave., St. Louis.

In addition to the St. Louis warehouse, Metal Goods also operates other warehouses located in Kansas City, Tulsa, Denver, Dallas, Houston, and New Orleans.

## De Laval Steam Announces New Executive Appointments

De Laval Steam Turbine Co., Trenton, N. J., has announced the appointment of R. G. Baker as regional sales representative. In his new post Baker's sales representation will extend over the territories of the company's Chicago, Detroit, and Minneapolis operations, but he will continue to make his headquarters in Chicago. He has been manager of the Chicago district office since 1934.

C. C. Bray has been named manager of the Chicago district office. He was formerly manager of the midwest district office of the company's standard-product division.

## Republic Supply Announces Mid-Continent Changes

Don L. Collins, vice president of Republic Supply Co., has announced personnel changes in the Mid-Continent area.

C. T. (Cam) Cox, former store manager at Oklahoma City, has been transferred to the Chicago office to replace J. T. Filkins, deceased. J. D. (Jack) Gale, former sales representative at Oklahoma City, has been promoted to store manager at that point replacing Cox; Earl (Speedy) Johnson has been employed as sales representative at Oklahoma City replacing Gale; John Roberson has been employed as sales reepresentative at Oklahoma City; R. S. (Bob) Battles, former sales representative at Elmore City, Okla., has been transferred to Russell, Kans., and promoted to store manager to replace A. M. Rouse, resigned; Jesse Young, former floor man at Elmore City, has been promoted to sales representative replacing Battles; R. E. Tener, former floor man at Ellinwood, Kans., has been transferred to Russell, Kans., and promoted to sales representative replacing V. V. Dick, resigned; M. J. (Jack) Steinbach, former floor man at Seminole, Okla., has been promoted to store manager at that point replacing W. A. Harper, resigned; P. B. (Pete) Martin has been employed in the Tulsa office as office manager and district purchasing agent replacing J. F. Gilbert, resigned.

## New Denver Warehouse for Raybestos-Manhattan

**New Denver warehouse opened by Raybestos-Manhattan has facilities to serve entire Rocky Mountain region.**

Announcement of the recent opening of its new Denver warehouse has been made by Raybestos-Manhattan, Inc., Passaic, N. J. The newly erected building has modern office and warehouse facilities.

Ample space is provided for carrying good stocks for proper servicing of the area. The new warehouse will serve the entire Rocky Mountain region with industrial rubber products and packings, as well as the Rocky Mountain and Western Canadian oil fields with hose, belting, packing, and friction materials. Trained personnel and modern equipment will be maintained for coupling hose, and matching V-belts.

Elton T. Fair, Jr., sales representative for the territory, is in charge of the new warehouse.

# Drilling Contractors

**Stout Oil Co.** has moved a rig to a wildcat location 8 miles southwest of Gering, in Scottsbluff County, northwestern Nebraska, where it will drill a Cretaceous test for Jackpot Oil Co. and Woodward Oil Co. at 1 Banning, C SW NE 17-21n-56w.

**Cresent Drilling Co., Inc.,** Monroe, La., has a contract with American Republics Corp., Houston, for a 10,000-ft. Smackover lime test to be drilled southeast of Haile, in the western part of the Monroe gas field, Union Parish, Louisiana.

**Louisiana Iron & Supply Co.,** Shreveport, is the contractor on a 3,300-ft. wildcat test which Sam Sklar and associates are drilling in the NW NW NE 6-9n-12w, a mile northeast of Oak Grove, Sabine Parish, Louisiana. Objective is the Fredericksburg sand.

**Penrod Drilling Co.,** Shreveport, contracting for its affiliated company, Hunt Oil Co., is drilling another test in the Muddy Bayou area, 1½ miles northwest of the North Saline Lake field, LaSalle Parish, Louisiana. The test will attempt to confirm the recent discovery of Wilcox production in that area. Hole is projected to 6,000 ft.

**Peterson Drilling Co.,** Shreveport, has a rig working for Humble Oil & Refining Co. at an outpost location, ½ mile south of production of the Glen Aubin field, in Adams County, Mississippi. The new operation is 2 Louella Hamilton, in 28-5n-3w. Contract is for 7,250 ft.

**Regent Drilling Co., Ltd.,** Edmonton, Alta., has the contract for a deep wildcat test which Sohio Petroleum Co. and associates will drill in the Wood Mountain area, in southern Saskatchewan Province. Location, in LSD 9, 18-3-3w3, is 15 miles north of the United States border. Hole is projected to more than 7,800 ft.

**Barnwell Drilling Co.,** Shreveport, has a rig working at a wildcat location in the Pleasant Hill area of Sabine Parish, northern Louisiana, on a contract with Taubert & Harper. The operation is 1 Sanders, with location in 33-10n-11w.

**Jay Dee Drilling Co.** has contracted with Dennis H. Petty of Oklahoma City for a Bartlesville sand test to be drilled at a wildcat location 3 miles north of Medford, Grant County, northern Oklahoma. Location is for 1 Zimmerman, in the C SW SE 4-17n-5w.

**Double-A Drilling Co., Ltd.,** Calgary, Alta., has a rig running at a rank wildcat location in Monkman Pass, 65 miles south of Dawson Creek, in northeastern British Columbia. The test, being drilled for Stony Lake Oil & Gas Syndicate, is projected to 6,000 ft.

**Wycoff & Williams** have taken a contract with Ashland Oil & Refining Co. for a rank wildcat test to be drilled 8 miles southeast of Colby, in the east central part of Thomas County, western Kansas. Location is for 1 Misner, in the NE NE NE 33-8s-32w.

**Owen Drilling Co.,** contracting for California Standard Co., has a new wildcat operation under way in the area east of Linklater oil production at Findlay, in Manitoba, Canada. The well is designated as 9-26 Findlay.

## Central Area

(Continued from page 229)

NE 31-9-14w, Ravenna Township, Muskegon County, increased oil production from this extender of Ravenna Traverse oil pool, and enhanced the prospect of this area developing into an important shallow western Michigan field. Well was originally acidized with 500 gal. and production was gaged at a steady 20 bbl. of oil, with no water, but following the reacidation, first production tests showed an average of about 45 bbl. a day, and operators were of the opinion that it would hold close to this figure. There was no water in evidence after second acid shot.

### ILLINOIS SUCCESSFUL WILDCATS

Randolph County: Jet Oil Co. 1 Easdale, SE NE NW 16-4s-5w, IP 65 bbl., Silurian 2,143-2,218 ft., TD 2,218 ft. (discovery well Tilden pool).

Saline County: Ralph Halbert 1 Harris, NW SW SW 34-8s-6e, IP 4,600,000 cu. ft. gas, Tar Springs 2,084-90 ft., TD 2,148 ft. (discovery well Harrisburg pool).

### ILLINOIS WILDCAT FAILURES

Bond County: T. M. Conrey 1 Kayser, SW SE NE 32-4n-3w, dry, TD 1,079 ft.

Christian County: Louis Marsch 1 Vollintine, SW SE NE 12-12n-1w, dry, TD 2,532 ft.

Clark County: Joe Reznik 1 Washburn, SE NW NW 32-9n-14w, dry, TD 2,581 ft.

D. E. Schock 1 E. Harlan estate, NE NE NW 33-10n-11w, dry, TD 2,499 ft.

Clay County: Nance & Vivadelli 1 Lewis, NW SW NW 27-5n-6e, dry, TD 2,877 ft.

Milton Smith 1 Wade, NE NE SW 3-5n-5e, dry, TD 2,511 ft.

Edgar County: F. B. Cline at al 1 Hughes & Powers, C W½ SW SW 15-15n-14w, dry, TD 1,944 ft.

Edwards County: Barron Kidd 1 Haeseler, NW SE SW 6-1s-14w, dry, TD 2,413 ft.

Lawrence County: Olds Oil Co. 1 Sabine White, SW SE SE 4-2n-13w, dry, TD 2,737 ft.

George & Wrather 1 Creek, SW SE NE 35-3n-13w, dry, TD 2,386 ft.

Madison County: E. A. Obering 1 Boyle et al, SE NE SE 17-5n-5w, dry, TD 2,690 ft.

Montgomery County: R. G. Lowery 1 Whitten, SE SE NE 25-8n-4w, dry, TD 1,246 ft.

Richland County: Illinois Mid-Continent Co. 1 Snively, NW NW NW 16-4n-14w, dry, TD 3,200 ft.

Washington County: The Texas Co. 1 Ibendahl, SW SW NE 32-3s-3w, dry, TD 2,953 ft.

Wayne County: Ryan Oil Co. 1 Bailey, NE SE SW 13-1s-9e, dry, TD 3,421 ft.

### INDIANA WILDCAT FAILURES

Gibson County: N. Appleby 1 Winslow-Townsley, E½ NE NE NW 2-3s-9w, dry, TD 1,928 ft.

Ryan Oil Co. 1 Robinson-Johnson-Fauquhar, SE SW NW 21-3s-11w, dry, TD 2,522 ft.

F. B. Drilling Co. 2 Stunkel, NW NW SE 25-2s-13w, dry, TD 2,344 ft.

Pike County: T. & H. Corp. 1 Runyon, SE NE SW 9-1s-8w, dry, TD 1,580 ft.

L. P. Galambos 1 Jackson, SW SE NW 2-1s-7w, dry, TD 2,752 ft.

Posey County: W. C. McBride, Inc., 1 Elsfelder, NW SE SE 20-5s-12w, dry, TD 2,855 ft.

Sullivan County: B. L. Filingame 2 Hopper, SE NE NE 20-7n-10w, dry, TD 850 ft.

Barnes Oil Co. 2 Lilly-Nolan, NW NE NW 30-8n-10w, dry, TD 952 ft.

Vigo County: Pure Oil Co. 1-A Talley, W½ NW NW SW 20-13n-9w, dry, TD 1,987 ft.

### WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: Great Lakes Carbon Co. 1 Heppler, NW NE NW SE 7-Q-27, dry, TD 1,925 ft.

McLean County: J. C. Ellis, Sun Oil Co. et al 1 Lindsey, NE NW SE 14-N-25, dry, TD 2,519 ft.

R. E. Hupp et al 1 Tippin, NW SE SW NW 1-M-28, dry, TD 724 ft.

Ohio County: Jordan-Villmayer 1 Chapman, NE NE NE NE 24-N-31, dry, TD 829 ft.

Todd County: Fortner et al 1 Cecil, SW SE SE NE 14-C-29, dry, TD 200 ft.

### MICHIGAN WILDCAT FAILURES

Allegan County, Clyde Township: W. B. Darke 1 Borowski, NE NE SW 22-2n-15w, Traverse 1,286 ft., dry, TD 1,291 ft.

Valley Township: Cook Drilling Co. B-1 U.S.A., NE SW SW 28-2n-14w, Traverse 1,329 ft., dry, TD 1,352 ft.

Iosco County, Reno Township: Mogul Oil Co. 1 Sibley, NW NW NW 2-22n-5e, dry in Richfield, TD 4,319 ft.

Muskegon County, Moorland Township: P. K. Degenther 1 Herman, NE SE NE 26-10n-14w, Traverse 2,064 ft., dry, TD 2,110 ft.

Oceana County, Benona Township: Max Spidel 1 Gifford, SE SW NW 9-14n-18w, Traverse 1,796 ft., dry, TD 1,815 ft.

Greenwood Township: Byron MacCallum 1 Mollett, SE NE NW 3-13n-15w, Dundee 2,530 ft., dry, TD 2,670 ft.

Ottawa County: Zeeland Township: Ford Oil Co. 1 Koert, NW SW SE 34-5n-14w, Traverse 1,524 ft., dry, TD 1,542 ft.

Van Buren County, Porter Township: Norman L. Stevens 1 Fox, NE NW NW 36-4s-13w, Traverse 1,127 ft., dry, TD 1,145 ft.

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

# CLASSIFIED ADVERTISING

UNDISPLAYED CLASSIFIED 20c a word one issue. 10% Discount three or more consecutive issues. $4.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

DISPLAY CLASSIFIED
$14.00 a column inch one issue . . .
10% Discount three or more issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

## EQUIPMENT FOR SALE

FOR SALE: National Drilling Machine #2 complete with tools. RIISE drilling motor A-1 condition. H. H. Henning, 627 7th Street, Marietta, Ohio.

5000′ of 4½″ API Full Hole Drill Pipe. 3,500′ of 3½″ Bottleneck Drill Pipe. 3,600′ of 3½″ Internal Flush External Upset Drill Pipe. All above pipe is Sonoscoped 70% #2 30% #3. Also 4600′ 4″ OD 14# R2 Sml. Drill Pipe w/5½″ OD Tool Joints. Milford Giffin, Tel. 477, Hoisington, Kansas.

**Stop Tong Breakage!**
**ARMITE DRILL COLLAR AND TOOL JOINT COMPOUND**
**ARMITE LABS.,**
**6609 Broad St., Los Angeles 1, Calif.**
Petro. Industries Consultants,
C. A. Caracas, Venez.

**FOR SALE**
5½″ OD, 15½ #, J-55, API, T&C,
Range-2 300 tons per month
January, February and March
shipment.
**BARON TUBE COMPANY**
**722 Oliver St., NW.**
**Atlanta, Georgia**

# USED EQUIPMENT

1—Bethlehem Pumping Unit
35 HP—19000# Polish rod load
W/ ZC 503 F&M Gas Engine

2—Ideco Pumping Units
44 HP—19000# polish rod load
1—W/ 739 F&M Gas Engine
1—W/ 503 F&M Gas Engine

1—Tank Battery, 4—250 bbl. tanks
10′x20′ Nt'l Treating System
2½′x10′ Nat'l Separator

1—Tank Battery, 2—210 Bbl. tanks
2½′x10′ Nat'l Separator

**CASING—TUBING—LINE PIPE**

**BROWN PIPE AND MACHINERY COMPANY**
**1311 W. T. Waggoner Bldg.**
**Phone ED 9628, Ft. Worth, Texas**

## EQUIPMENT FOR SALE

**WELL drilling equipment, new or used Spudders, rotaries, core & shot hole drills tools, pipe, bits, blocks, pump jacks, valves Everything for well drilling and service Fishing tools rented. Pressey & Son, Pueblo, Colo.**

DERRICK for sale. We have two guyed type derricks for lifting loads. Main derrick is 80 feet, swings 360 degrees on New Departure Thrust bearings. It also has 34 foot boom, longer boom can also be used. The derrick can also be used as a basket boom. Ideal for loading at a refinery. John A. Costelow Co., 125 Kansas Ave., Topeka, Kans.

**900 MILES LINE PIPE**
Selected, No. 1 grade. Thoroughly reconditioned for re-use.
400 Miles 8⅝ in. O.D., 29 lb., .322 wall
200 Miles 8⅝ in. O.D., 24 lb., .285 wall
200 Miles 6⅝ in., O.D., 19 lb., .280 wall
100 Miles 12¾ in., O.D., 50 lb., .375 wall
**It's for sale, write**
**Box G-104, The Oil and Gas Journal, Tulsa, Oklahoma**

**PRESSURE VESSELS**
**IMMEDIATELY AVAILABLE**

13—10′ ID dia. x 40′ long x 2½″ to 3″ shell. Heads 3½″ to 3″. WP 600 and 500 psi.

6—8′ ID dia. x 40′ x 2″ to 2½″ shell. Head 2¼″. WP 500 psi.

1—6′ ID dia. x 40′ x 2″ shell. Heads 2¼″. WP 300 psi. at 900° F.

All used, good condition, seam to seam lengths, code welded construction. Built by A. O. Smith Corp. Located near Chicago, Illinois. Prints, prices available on request.

**KINSLOW POWER & EQUIPMENT CO.**
**617 So. Boulder Phone 5-5914**
**Tulsa 14, Oklahoma**

**Used Seamless BOILER TUBES**
2¼″ O.D.
3¼″ O.D.
3½″ O.D.
4″ O.D.
5⅜″ O.D.
5½″ O.D.

Approximately 5 miles of each diameter available in single or double random lengths with beveled ends.

**Write—Wire—Phone**

**SONKEN-GALAMBA CORPORATION**
**2nd and Riverview (X-851)**
**Kansas City 16, Kansas**
**THatcher 9243**

## EQUIPMENT FOR SALE

**FOR SALE: One 36-L Bucyrus-Erie drilling machine, complete with tools. Also 1,943 ft., new 7 inch, 17 lb., H-40, range 2, seamless casing and 2,409 ft. of new 2⅜ inch, 4.60 lb., range 2, J-55, seamless regular tubing. Box E-812, The Oil and Gas Journal Tulsa, Oklahoma.**

**FOR SALE: R. L. Cardwell with HXE Hercules Engine, 1st class condition, $6,500.00. Fred Cooper E 563 Winch Tractor, Single Drum mounted on six 75-inch Tires, 50 ft. mast, fine condition service 5,500 feet of 2½ inch upset tubing. Box 1215, Tulsa, Phone 5-5850.**

ONE Emsco-500 equipped with 1-year old 2505 Buda Diesel Engines, Lee C. Moore triple jackknife mast with substructure, Shaffer blowout preventer, steel mud tanks, Keico power slips, 8,000 ft. 4½-in. drill pipe with Reed Shrink Grip tool joints. Rig is complete, in good condition, ready to run. Box G-125, The Oil and Gas Journal, Tulsa, Oklahoma.

**Gaso Duplex 4½″ x 6″ Power Pumps with Chrysler C-35 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.**
**H. H. COFFIELD**
**Attn.: W. H. ORR**
**Phones: 132—Rockdale, Texas**
**AT-3427—Houston, Texas**

# DIESEL ENGINES

1—McIntosh-Seymour Model 4-B-33, 400 HP @ 200 RPM, Ser. No. 1834

2—McIntosh-Seymour Model 4-B-34, 400 HP @ 200 RPM, Ser. No. 1915 and 1918

Engines will be in operation at Cromwell, Oklahoma, until Dec. 1, 1952, and available for removal shortly thereafter.

**INTERSTATE OIL PIPE LINE COMPANY**
**P. O. Box 1349, Tulsa, Okla.**
**Attn: Mr. J. M. Bradley,**
**Phone 5-5581, Write or Wire**

# FOR SALE

**1—Elliott—Turbo Blower Sr. #643, Type O, 7950 C. F. M. Inlet Pressure 14.6 lb. per sq. in. ABS, Discharge Pressure 15.9 lbs. per sq. in. ABS, 3550 RPM, Sp-Gr. of Gas Air Bar. 29.8 in. H. G., Inlet Temp. 110° F. Coupled to a 75 HP, 220/440 Volt, 3600 RPM, 3 PH, 60 Cy. Elliott Motor—Drip Proof—Excellent Condition.**

**BRAZOS ENGINEERING CO.**
**224 Raines Street Houston, Texas**
**PHONE: FAirfax 8367**

## EQUIPMENT FOR SALE

4—125 hp. 300# WP Kewanee Oil Field Type Boilers. 1—85 hp. 125# WP Kewanee Oil Field Type Boiler. These boilers are in excellent condition. Woodford Supply Co., P.O. Box 84, Okla. City, Okla. Phone 3-1454.

1—G.M. QUAD Engine on skid connected to 20 groove sheave for Independent pump drive complete with 2500 gal. fuel tank—$9,500.00. Also have two (2) $10^{3}/_{4}$-6000# ORC Preventers, One (1) $10^{3}/_{4}$ 6000# DV Master Valve for sale or trade for $13^{3}/_{8}$" similar equipment. T-W Drilling Co., 1407 National Bank of Commerce Bldg., New Orleans, La. CAnal-8220.

FOR SALE: Garnett, Kansas. One 50 hp. $13^{1}/_{4}$ x 16 Type C. Superior 2 cycle oil engine with plain bearings. Serial No. 20475. New 1937. $750. Joe A. Huitt, Deep Rock Oil Corporation, Tulsa.

OIL Field Casing. New $5^{1}/_{2}$" and 7" German casing from Houston storage. Immediate delivery. P.O. Box 929, Houston, Texas.

1—I-R XOB 10" Compressor, 2—11" X 16" and 2—$5^{1}/_{2}$" X 16" Superior Compressor Cylinders. 5—16" X 20" Worthington Compressor Cylinders. Alfred B. Kern, 223 Wright Bldg., Tulsa, Oklahoma.

**FOR SALE**

**NO. 1 USED LINE PIPE**

**$4^{1}/_{2}$ miles 4" O.D.**
**$2^{1}/_{2}$ miles 4" I.D.**
**$1^{1}/_{2}$ miles 3" I.D.**

**FOR INSPECTION CALL L. G. HULS, Perkins, Okla.**

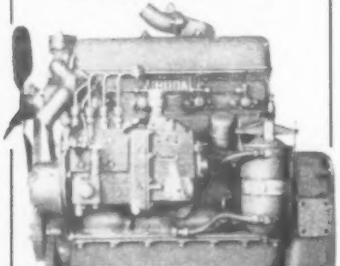
**Inventory Sale**
**of**
**Surplus New**
**PIPE FITTINGS**

Caps
Check Valves
Plugs
Bushings
Unions
Reducers
Nipples
Floor Flanges

Large quantities of all sizes available in Black and Galvanized.
Submit your requirements.
**Write—Wire—Phone**

**SONKEN - GALAMBA CORPORATION**
**2nd and Riverview (X-900)**
**Kansas City 18, Kansas**
**THatcher 9243**

**20 NEW BUDA 4-BD-153 DIESEL ENGINES IDEAL FOR OIL FIELD USE**



BUDA LANOVA 4 CYLINDER DIESELS, 3 7/16 x $4^{1}/_{8}$, 153.1 cu. in. piston displacement, 40.5 horsepower at 2400 rpm. With starters, generator, fly wheel, fly wheel housing, fan and fan belt. NEW in original crates. $950.00 each F.O.B. Chicago, Illinois.

**ACME EQUIPMENT CO., INC.**
**126 South Clinton St., Chicago 6, Illinois**
**Andover 3-3430**

## EQUIPMENT FOR SALE

**SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.**

FOR SALE—One GMR-4 Cooper-Bessemer 300 horsepower, 300 rpm angle type engine equipped with three $8^{1}/_{4}$" x 14" compressors —maximum discharge 500#. Engine equipped with exhaust mufflers and air filters. Price $10,000 f.o.b. location near Parkersburg, West Virginia. Also, one Clark Bros. Super two cycle 125 horsepower 200 rpm horizontal gas engine with high and low stage compressor cylinders 9" x 20" and 15" x 20" respectively. Price $3,750 f.o.b. present location 20 miles from Charleston, West Virginia. Address inquiry to Columbian Carbon Company, Box 873, Charleston, 23, West Virginia.

**FOR SALE: New 5,000 Bbl. Cap. API 10 Gauge Bolted Steel Tank. Ready to Ship Attractive Price. Lestan Corp., Rosemont, Penna.**

1 Oilwell Steam Pump, $16^{1}/_{4}$ x $7^{3}/_{4}$ x 20" 1 Gardner-Denver Steam Pump, 18 x 8 x 20". Both pumps are in excellent condition, may be seen at Makin Drilling Company Yard, Hobbs, New Mexico. MAKIN DRILLING COMPANY, Box 1628, Hobbs, New Mexico.

**LIQUIDATING REFINERY & GASOLINE PLANT EQUIPMENT**

**Located Tulsa, Oklahoma, area — Used, condition good. All Welded—API ASME Code construction**

**SHELL & TUBE HEAT EXCHANGERS AND COOLERS.**

1—Devine Cooler, 405 sq. ft. surface; shell 150#, tubes 400# $1^{1}/_{4}$" OD Steel.
2—Devine Bottoms Coolers, 950 sq. ft. surface each; shell 250#, tubes 150# 1" OD Admiralty.
1—Griscom-Russell Condenser, 200 sq. ft. surface; shell & tubes 150#; tubes Admiralty.
2—Griscom-Russell Coolers, 100 sq. ft. each surface; G-Fin sections; shell & tubes 75#, tubes Admiralty.
3—Devine Coolers, 1000 sq. ft. surface each; shell & tubes 100#, tubes 1" OD Steel.
2—Coy Coolers, 134 sq. ft. surface each; shell 175#, tubes 150# 1" OD Steel.
1—Devine U-Tube Preheater, 350 sq. ft. surface; shell 325#, tubes 140# 1" OD Admir.
1—Devine Cooler, 185 sq. ft. surface; shell 300#, tubes 350# $1^{1}/_{4}$" OD Steel.
1—Griscom-Russell Reboiler, 500 sq. ft. surface; shell 150#, tubes 150# $^{3}/_{4}$" OD Timken.

**TOWERS & PROCESS VESSELS.**

1—Devine Evaporator 9' dia. x 40' x $^{5}/_{8}$" shell & $^{3}/_{4}$" heads; has 14 trays. 50 psi. WP.
1—Southwestern Eng. Depentanizer Fractionator, 7' dia. x 65' 2" x $^{3}/_{8}$" shell; has 24 bubble cap trays. 50 psi. test.
1—Devine Stripper, 4' dia. x 15' x $^{3}/_{8}$" & $^{1}/_{2}$" heads. Has four bubble cap trays and 10' skirt; overall length 25'. 50 psi. WP.
1—Badger Stripper 4' 6" dia. x 15' $7^{1}/_{2}$" including 18" skirt. Has 6 trays bubble type. Shell & heads $^{1}/_{2}$". 80 psi. WP.
2—Drip Tanks 1' $7^{1}/_{4}$" dia. x 4' x $^{1}/_{4}$" shell.
1—Butane Frac. Column 3' 6" dia. x 23' x 5/16" shell & $^{1}/_{2}$" heads. 100# WP.
1—Receiver tank 3' 6" dia. x 8' x 5/16" shell and $^{1}/_{2}$" heads. 100 psi. WP.
1—Octane Column 1' $11^{1}/_{4}$" dia. x 29' 10" x $^{3}/_{8}$". 100 psi. WP.
1—Receiver, 1' $11^{1}/_{4}$" dia. x 7' 6" x $^{3}/_{8}$". 100#.
1—Devine Treater, 2' dia. x 17' $1^{1}/_{2}$" x $^{3}/_{8}$" shell and heads; 350 psi. WP.
1—Columbian Clay Tower 8' dia. x 27' x $^{3}/_{8}$" shell & $^{5}/_{8}$" heads; 50 psi. WP.
1—Flue Surge Tower 3' dia. x 29' 4" x 7/16" shell & heads; 100 psi. WP.

**KINSLOW POWER & EQUIPMENT CO.**
**817 So. Boulder, Strode Bldg.**
**Phone—5-5914**
**Tulsa 14, Oklahoma**

## EQUIPMENT FOR SALE

FOR SALE: Walker-Neer 32-Special new in March 52, complete with all top-to-bottom tools, new lines and 1952 G.M.C. truck. W. H. Bass, phone 1376, Mt. Carmel, Illinois.

FOR SALE: Rigging, Crown Blocks, Type EM, 5, 6 and 7 sheave $1^{1}/_{8}$" and $1^{1}/_{4}$" groove, 300 and 500 ton capacity. 3-18 X 18 X 20 Gardner-Denver Mud Pumps. 5005 Holmes Road, Houston, Texas. Phone OL-2636.

**COMPLETE Cardwell rotary rig; 6 x 16 pump; 87' Lee C. Moore mast; 3,000' $4^{1}/_{2}$" drill pipe. Price $30,000. Ready to drill. Box G-100, The Oil and Gas Journal, Tulsa, Oklahoma.**

FOR SALE: Failing "1500" Holemaster powered by Chrysler industrial power unit, mounted on 1942 GMC truck. Rig complete with mud pump, 1,000' of "N" rods, drill collar and core barrel, slips, elevators, subs, etc. Equipment showing very little use. 1—1942 GMC water truck, A-1 condition. For inventory contact P. O. Box 409, Del Rio, Texas.

FOR SALE: One T5A-16 Lufkin Pumping Unit powered w/ Fairbanks-Morse ZC-346 engine, been in use about 15 months, $2,700.00; also another T5A-16 Lufkin Pumping Unit powered w/ Fairbanks-Morse ZC-346 engine, unit been in use about 18 months but engine only 6 months, $3,000.00. If interested in both units, price would be $5,500.00, F.O.B. our location, Hughes County, Oklahoma. Contact Thos. J. Carter, 363 Rio Grande National Bldg., Dallas, Texas.

FOR SALE: 5,000 $8^{5}/_{8}$" O.D. Used 8-V recessed couplings off of 28.55# pipe that is clean, the dutchmans having been removed with a machine thread in perfect shape. Will sell any part for $1.50 each F.O.B. Shreveport, La. Contact A. A. Gilbert Pipe & Supply Co. P. O. Box 986 or Phone L. D. 97.

FOR SALE: 7500' rotary rig w/ 7250'—$4^{1}/_{2}$" B.N. drill pipe, in good condition. Triple Lee C. Moore derrick & substructure. Rig is complete, & in good condition. Ready to drill. A real bargain. If interested write for inventory. P. O. Box 973, Duncan, Oklahoma.

## EQUIPMENT FOR LEASE

HEAVY wing Bonanza for lease. Complete instrument panel, OMNI, VHF, cabin air conditioner, constant speed prop. Contact us for lease arrangements for aerial transportation. Ritchey Flying Service, Meacham Field, Fort Worth, Texas. Phone MA-2158.

TWIN Beach Executive D18S for lease to responsible companies. Complete instrument panel—ILS and OMNI—three chairs, 3-passenger couch. Auxiliary 80 gal. nose tank. 2 NTSO P&W engines, hydraulic props. Just re-licensed—ready to go. Ritchey Flying Service, Meacham Field, Fort Worth, Texas. Phone MA-2158.

## EQUIPMENT WANTED

WANTED: Three engine compound for Wilson Titan drawworks. Makin Drilling Company, Box 1628, Phone 3-3141, Hobbs, New Mexico.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

## HELP WANTED

CHEMICAL ENGINEER for design and/or field installation of gas process equip. At least 2 years exp. in plant process or construction. Leading S. W. Manufacturer. Box E-992, The Oil and Gas Journal, Tulsa, Oklahoma.

**CHIEF ENGINEER**

Excellent opportunity in Los Angeles area for a young and progressive engineering executive with leading manufacturer of oil tools. Requires thorough and complete background in engineering and extensive experience in specialized field or oil tool products. Age limit 35-45. Salary commensurate with experience and ability. Please give full information, including age, education and experience. Box E-996, The Oil and Gas Journal, Tulsa, Oklahoma.

## HELP WANTED

PETROLEUM GEOLOGIST wanted in West Texas by independent oil company. Desire one to three years of practical experience in sample work and subsurface mapping. Reply should give experience, education, age, marital status and starting salary required. Box E-959, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER wanted by independent oil company in West Texas. Require two to four years working experience in drilling and production. Reply in detail stating education, experience, age, marital status and starting salary desired. Box E-958, The Oil and Gas Journal, Tulsa, Okla.

INSTRUMENT man with sufficient refinery experience to install and maintain instruments and head instrument department in modern refinery now under construction. Should have experience in catalytic cracking instrumentation. Box G-121, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Chief Engineer for independent MidContinent refinery to take charge of the Maintenance and Inspection Department. Applicant should have experience in inspection work, choice of materials, and refinery maintenance. Box G-131, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL engineer with eight years' experience in the construction and maintenance of refinery equipment to assume duties of mechanical superintendent in new modern refinery. Must have experience on fluid catalytic crackers and experience in metal inspection desirable. Box G-112, The Oil and Gas Journal, Tulsa, Oklahoma.

**. . CHEMICAL . .**
**ENGINEER**
**or**
**CHEMIST**

**Major Company has opening in Venezuela for Chemical Engineer or Chemist with experience in operation of Podbielniak Column.**

**Prefer also experience in operation P.V.T. equipment but not essential requirement. $7160 annual earnings plus maintenance.**

**P. O. BOX 35**
**Bowling Green Station**
**New York 4, New York**

**WANTED**
**GAS ENGINEER**

The man we want must have numerous contacts in the natural gas industry and be cognizant of newly discovered wells, the economics of gasoline absorption and be able to conduct negotiations therefor. Send complete resume of experience including salary requirements, references and availability.

**Box G-136**
**THE OIL AND GAS JOURNAL**
**Tulsa, Oklahoma**

**. . RESERVOIR ENGINEER . .**

Major Oil Company in Venezuela has opening for Graduate Petroleum Engineer or Geologist for work in Production Laboratory. One year's experience with PVT equipment desirable.

**WRITE GIVING FULL DETAILS TO: P. O. BOX NO. 35**
**Bowling Green Station, New York 4, New York**

## HELP WANTED

REFINERY operators with sufficient experience in crude distillation, fluid catalytic cracking, gas polymerization and treating and qualified to assume shift foreman positions in new modern refinery. Box G-114, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: SEISMIC SUPERVISOR. Must have Party Chief experience, age 30 to 38, degree Geology or Geophysics. Replies will be kept strictly confidential. Call or write giving complete experience. A. E. "Sandy" McKay, Continental Geophysical Co., 602 Continental Life Building, office phone Fannin 9231, Residence phone Sunset 6053, Fort Worth, Texas.

**SALES ENGINEER**

We are looking for a man who has a background of both sales and engineering. Must be college graduate, between 28 and 38 years of age, and should now be earning between $5000 and $8000 a year. We want the best man we can find for this position. Let us increase your earnings now and show you how to build a real future. Salary and expenses plus commission and bonus. Our entire organization knows of this ad. All replies kept confidential. Write P. O. Box 1373, Tulsa.

**WELL-DRILL SALESMAN**

Need man experienced in selling drilling rigs to oil and gas industry. Leading equipment distributor has opening for go-getter acquainted in Western Pennsylvania oil and gas fields to specialize in well drill sales. Salary, new car and expenses. Write giving all personal and business background; snapshot desirable. Reply to

**H. A. CAMERON**
**General Sales Manager, Beckwith Machinery Company**
**6550 Hamilton Ave., Pittsburgh 6, Pa.**

# SOUTH AMERICA

Affiliates of STANDARD OIL CO. (N. J.) can offer attractive staff positions to qualified men with oilfield or refinery experience in following categories:

PROJECT ENGINEERS
REFINERY PROCESS ENGINEERS
PIPELINE ENGINEERS AND SUPERVISORS
DRILLING ENGINEERS
STRUCTURAL DESIGNERS
PIPING DESIGNERS
EQUIPMENT ENGINEERS AND INSPECTORS
SAFETY SUPERVISORS
PRODUCTION SUPERVISORS
MECHANICAL FOREMEN
CARPENTER FOREMEN
METALS FOREMEN

Write giving age, marital status, education and detailed experience.

**Box 308-M, Radio City Station, New York 19, N. Y.**

## HELP WANTED

OIL Industry Employment Service. 405 Tuloma Bldg., Tulsa, Okla. 4-5074. Tom Robinson, owner. For Technical and Trained Personnel, including LPG.

ASSISTANT Controller — Integrated oil Company in Mid-Continent area is seeking an experienced Assistant Controller. Position requires top-level man with experience in oil, systems and costs. Please submit resume which must give complete data on experience, salary requirements, and personal history, including education, background and associations. Box E-965, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMIC PERSONNEL needed for United States and Canada by well known and expanding contract geophysical company. Address Box E-863, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Graduate electrical, civil or mechanical engineer for office and field work by major oil company in Middle West. Please state age, experience and educational qualifications. Box G-105, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE Chemist with three years' experience in refinery laboratory to set up and be in charge of laboratory in new modern refinery. Box G-113, The Oil and Gas Journal, Tulsa, Oklahoma.

SUBSURFACE Engineer: Medium sized, rapidly expanding production company with headquarters in Houston and production in East, South and West Texas, needs competent petroleum engineer with considerable geological experience to head up subsurface end of engineering department. Should have minimum two years field engineering experience in production, drilling, completions, workovers, and well geology, and in addition, have two to three years specialized training and experience in geological engineering with some degree of responsibility in directing development programs. State complete details of education, experience, and salary range which would be acceptable. Will consider applications from geologists who feel qualified. All applications will be treated as confidential and will be given immediate consideration. Box G-138, The Oil and Gas Journal, Tulsa, Oklahoma.

## SITUATIONS WANTED

SUBSURFACE geologist, four years experience in Texas, desires change. Prefer Kansas or Oklahoma. Box G-106, The Oil and Gas Journal, Tulsa, Oklahoma.

DESIRE Sales Representative Position in Oil Industry, preferably in North Texas or Oklahoma, but will consider any location. 29 years old, married, and two children, 7 years varied experience with major oil companies in production, pipe line, oil well servicing, and service engineering. Box G-120, The Oil and Gas Journal, Tulsa, Okla.

PURCHASING Agent—Specialist oil tools, tubular, refinery. Field experience, 6 yrs. with major Middle East producer. Extensive general coverage. Excellent contacts, foreign and domestic. Proven administrator. Consider any location. Box G-137, The Oil and Gas Journal, Tulsa, Oklahoma.

SIX years experience with Oil Field Supply Companies, desires position with an Oil Company in Material and Purchasing department. Can furnish references. Age 29. Single. J. O. McMurray, Jr., 1733 Swenson Street, Abilene, Texas. Phone 4-8964.

REFINERY Superintendent, Age 43, with 22 years experience in operations and construction, three years foreign service, desires new connection with opportunity. Box G-139, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Technologist, Hons. B.Sc., 32, married no children, ten years' experience Oil Industry including Laboratory, Research, Pilot Plant and Production Plant Supervision, desires position with scope for advancement U.S. or abroad. Box G-134, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 1628, Ph. No. 3-3141, Hobbs, New Mexico.

## SITUATIONS WANTED

CONSULTING ENGINEER. Available for fee or retainer representation in Rocky Mountains, Permian Basin, and Kansas. Evaluations and Supervision of Royalty or Operating Interests. Geological Reports and Deal Negotiations. References. Box E-968, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER: 10 years' experience in drilling and production, excellent references. Box G-111, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION SUPERINTENDENT - PETROLEUM ENGINEER. Oklahoma University. 11 years responsible operational and administrative experience. 5 years sales and management technical services and tools, 4 years assistant general superintendent drilling and producing, 2 years general production manager Kansas and Rocky Mountains. Experienced leases, deal negotiations, geological and engineering evaluations, drilling and producing operations, sales and management. Will carry load and earn way with established, active organization operating Mid-Continent or Rocky Mountains. Age 38. Details without obligation. Box G-115, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer (graduate) desires responsible position with independent. Four years diversified experience West Texas, New Mexico (two major, two independent). Box G-133, The Oil and Gas Journal, Tulsa, Oklahoma.

## REWARD OFFERED

STOLEN!!! New christmas tree valve from Central Pennsylvania. 10,000# test. Serial No. 51-52-10-1044. Manufactured by Oil Center Tool Company. $500.00 reward information. Box G-124, The Oil and Gas Journal, Tulsa, Oklahoma.

## PRODUCTION WANTED

**OIL PRODUCTION**
**WANTED—ANY AMOUNT—ANY AREA**

Full details required. Must stand Engineering investigation. CONFIDENTIAL.

**TAXMAN OIL COMPANY**
**414 Finance Bldg. Kansas City 6, Mo.**

## ROYALTIES

**WILLISTON BASIN ROYALTIES**

Dealers in Montana royalties since 1921, we now specialize in royalties under major company leases in the Montana portion of the Williston Basin. For information on our method of operation, write LANDOWNERS ROYALTIES COMPANY, Box 1225, Great Falls, Montana.

JACK EAGLE—Pay you immediately for your producing royalties and Overrides, absolutely no delay, send complete details 706 City Nat'l Bldg., Okla. City, Okla REgent 6-7027.

**PRODUCTION**
**We Will Buy**

PRODUCING landowners royalty and producing leases. Any amount, any area. Confidential information required and furnished. A 1 Bank Reference.

**COMBEST ROYALTY COMPANY**
**825-826 Amarillo Bldg.**
**Amarillo, Texas**

## LEASE AND DRILLING BLOCKS

LITTLE man's chance. Redrill 80 acres, originally had 4 oil wells. 1/32 interest $100, into tanks if a commercial producer. Producing offset well now. Send cashier's check or money order, will cash when sand is drilled. L. Price, Coweta, Oklahoma.

BEAVER LODGE MINERALS — Williams Co., N. Dakota. I own and offer for sale 28 acres minerals, half mile west of 1,000 bbl. well. These minerals should be structurally higher than wells to East. Louis Egan, 210 Empire Bank Building, Dallas, Texas.

FOR LEASE: 100 acres Atascosa County, Texas. East Imogene Field. Both shallow and deep production by major oil company on adjoining property and within 1,000 feet. Box G-135, The Oil and Gas Journal, Tulsa, Oklahoma.

**LEASES ROYALTIES**

**Producing and Nonproducing**
**Bought and Sold—Any Area**
**Inquiries Invited**

**B. D. BUCKLEY**
**8633 Delmar Ave., St. Louis 5, Mo.**

## RANCHES AND FARM LANDS

# MAGNIFICENT COLORADO MOUNTAIN - LAKE PROPERTY

**Ideal for Private Club, Camp, or Resort**

210 acres, including 35-acre spring fed lake adjoining town of Buena Vista, Colorado, in most beautiful part of Rockies. Altitude 8000 ft. Fishing—skiing; deer, elk, bear and duck hunting. Old irrigation water right in addition to springs feeding lake; 35 acres hay meadow; one 8-room stone-concrete dwelling, easily convertible into Club House; one 64' x 140'—height 40' natural frame ice storage. Reached via Highway #24 or D&RGW Railroad to Buena Vista, Colorado. Will show by arrangement and will consider best offer. Address:

**AMERICAN REFRIGERATOR TRANSIT COMPANY**
**1218 Olive Street, St. Louis 3, Missouri**

## PRODUCTION WANTED

## "IS THIS THE TIME TO SELL YOUR PRODUCTION?"

Payment of capital gains tax today, nets you an amount almost comparable to your ultimate net realization (after taxes and depletion).

If you should consider selling—**WE WANT TO BUY,** as cost depletion will give us an entirely different tax basis. We are reliable and financially responsible producers. Bank references will be readily furnished. **We are not brokers.**

Also interested in drilling proposals with geological merit. We are not interested in Conversation, we want to buy or drill. Please submit your proposals and they will be given courteous, prompt and business-like attention. All inquiries will be held in strictest confidence.

**BOX G-109, THE OIL AND GAS JOURNAL, TULSA, OKLAHOMA**

## LEASE AND DRILLING BLOCKS

FOR SALE: 8000 acres State and Federal leases in De Baca County, New Mexico. Box G-110, The Oil and Gas Journal, Tulsa, Oklahoma.

**LEASE FOR SALE**

Williston Basin 40 acre oil and gas lease in Section 28, Twp. 22 N., 1 East, Harding County, South Dakota. For details write A. H. Thege, Wahoo, Nebraska.

WOULD like to contact Company interested in shallow Oil and Gas production who will help us develop our Southern Ohio Leases. Four wells now producing from highly saturated sand. Also proven for gas, and connected to the market. Pipe on ground for additional drilling. Will consider outright sale. Contact George Kissling, Jr., 239 Mulberry Ave., Pomeroy, Ohio. Ph. 363-J.

FOR SALE: Producing Oil Lease. Almost 700 acres Eastern Kansas. Oil 32 gravity. Suitable for water flood. Have core analysis. W. R. Jenner, 501 South Topeka, Wichita 2, Kansas.

FOR SALE: All the proven leases in an Eastern Kansas field. Part now producing. High gravity oil. Major pipe-line connection. Good sand body. Suitable for water flooding. W. R. Jenner, 501 South Topeka, Wichita 2, Kansas.

FOR SALE: Producing Oklahoma Leases of the Oscar R. Howard Estate in the Bird Creek, Flat Rock and Red Fork Districts, and one in the Bristow area, and lease equipment. For information on descriptions, logs, production, and terms of offer, contact W. G. Tobler, Room 101, 424 South Cheyenne, Tulsa, Oklahoma. Phone 3-7141 or 7-9430. Bids must be submitted by October 30, 1952.

**WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2183, Denver, Colorado.**

DEALERS Over 440 New Oil and Gas Fields Opened in Texas 1951. Wildcat or Proven Acreage. Write for Sofshell Pecan Prices. Express Paid. E. M. Adams, Marshall, Texas.

## BUSINESS OPPORTUNITIES

FINANCIAL and experienced help wanted with equipment to develop. Three central Illinois shallow potential oil pools. R. D. Claypool, Lock Box 36, Williamsville, Illinois, Telephone 6.

## BUSINESS OPPORTUNITIES

**CUBA, THE COMING OIL COUNTRY**

NEED $50,000.00 to develop potential proven shallow field (6,500 acres) lease. Will take as part investment 36-L Bucyrus with tools from 13 to 5, or similar cable tool equipment. Investor will participate from refinery profits. Write: M. A. NOGUERA, Aguiar 574 St. Havana, Cuba.

## REAL ESTATE FOR SALE

# MT. VERNON, ILLINOIS

3 Metal Buildings 12,000 Square Feet

1 concrete block office building 1,400 square feet.

Storage docks and pipe racks on 5-acre lot 625' x 355' enclosed with 6' Cyclone Fence. Ideal location for independent oil operator trucking firm. Industrial Concern Warehouse.

**Address: H. F. FISHER**
**P.O. Box D-15 St. Louis, Missouri**

## LEGAL

4,808.37 acres of Tribal Indian lands located on the Uintah and Ouray Indian Reservation, Township 1 North, Range 2 East, Uintah Special Base Meridian Survey, in Uintah County, State of Utah, are being advertised for oil and gas lease sale, bids on which will be opened 2:00 P.M., October 28, 1952 at the office of Harry W. Gilmore, Superintendent, Uintah and Ouray Agency, Fort Duchesne, Utah. Full particulars may be obtained from the office of the Regional Oil and Gas Supervisor, U. S. Geological Survey, Casper, Wyoming, or from the Uintah and Ouray Agency.

# ADVERTISERS


Allis-Chalmers Mfg. Co. 49
Alten Foundry & Machine Works 211
Aluminum Co. of America 167
American Cable Division of American Chain & Cable Co., Inc. Inside Back Cover
American Cyanamid Company 60
American Iron & Machine Works Co. 110
American Locomotive Company 57
American Meter Company 35
American Optical Company 44
Anglo-Iranian Oil Company, Limited 186
Axelson Manufacturing Company 17, 26
Baash-Ross Tool Company 139
Baird Mfg. Co. 118
Baker Oil Tools, Inc. 64, 217
Bank of Toronto, The 191
Baroid Sales Division, National Lead Company 65
Bell Rubber Company 210
Bethlehem Supply Co. 15
Boston Woven Hose & Rubber Company 56
Bovaird Supply Co., The 41
Brooks Paper Company 149
Byron Jackson Co. Front Cover
Cameron Iron Works, Inc. 161
Carbide & Carbon Chemicals Company, A Division of Union Carbide and Carbon Corporation 157
Carboloy Department of General Electric Company 62, 63
Carpenter Steel Company, The 18
Carter Company, Inc., S. C. 120
Chain Belt Co. 51
Chicago Bridge & Iron Company 89
Chrysler Corporation, Industrial Engine Division 29
Classified Advertising 239, 240, 241, 242
Colorado Fuel and Iron Corp., Wickwire Spencer Steel Division 69
Connelly, Inc. 205
Consolidated Engineering Corporation 36
Construction Machinery Co.'s 194
Continental Supply Co., The 37, 38
Cooper, Inc., Fred E. 197
Core Laboratories, Inc. 119
Crose Manufacturing Co., Inc., M. J. 198
Darling Valve and Mfg. Co. 164
Dean Brothers Pumps, Inc. 199
Delta Engineering Sales Co. 206
Dowell Incorporated 94
Dresser Industries, Inc. 54, 216
Dresser Manufacturing Division 54
Drilling & Service, Inc. 225
Drilling Equipment Mfg. Co. 107
du Pont 10
Eagle-Picher Sales Co. 159
Edward Valves, Inc. 6
Empire Trust Company 222
Emsco Derrick & Equipment Co. 37, 38
Ensign Carburetor Company 52
Equivalent Valves Company 205
Ethyl Corporation 19, 20
Fairbanks, Morse & Co. 3
First National Bank of Midland, Texas, The 145
First National Bank of Shreveport, The 203
Fluor Corporation, Ltd., The 204
Foster Wheeler Corp. 58
Franks Machine Co. 219
Frontier Chemical Company 203
Fuller Company 28
General American Transportation Corporation 70
General Electric Company 62, 63
General Electric Co., Electronic Dept. 12
Geograph Company, Inc., The 222
Globe Oil Tools Company 200
Globe Steel Tubes Co. 25
Goodall Rubber Company 167
Gordon Co., Claud S. 172
Grancell, I. H. 201
Gulberson Corporation 221
Halliburton Oil Well Cementing Co. 13
Harvey & Co., Ltd., G. A. 40
Hercules Tool Company 214
Houston Contracting Company 198
Huey & Co., S. E. 198
Hughes Tool Co. Back Cover
Independent Exploration Co. 34
Inferno Co., The 202, 226
International Harvester Co. 97
International Nickel Company, Inc., The 74
Iverson Supply Company 128
Johns-Manville Corporation 190
Jones & Laughlin Supply Co. 23
Kelley Company, Ben F. 218
Koch Engineering Company, Inc., The 184
Koppers Company, Inc. 39
Lane-Wells Company Inside Front Cover
Larkin Packer Company, Inc. 224
Le Bus International Engineers, Limited 123
Le Grand, Sutcliff & Gell, Ltd. 223
Leschen & Sons Rope Co., A. 213
Levingston Shipbuilding Co. 171
Link-Belt Company 5
Lonergan Co., J. E. 198
Macwhyte Co. 3
Magnet Cove Barium Corp. 216
Manhattan Rubber Division, Raybestos-Manhattan, Inc. 34
Manning, Maxwell & Moore, Inc. 22
Mayo Hotel, The 206
McCord Corporation 201
McCullough Tool Company 182
McKee & Co., Arthur G. 31
Metal Goods Corporation 8
Mid-Continent Supply Company 109
Mission Mfg. Company 227, 228
Mundet Cork Corporation 217
Murdock Tank Mfg. Co. 226
National Airoil Burner Co., The 206
National Bank of Tulsa 11
National Geophysical Company, Inc. 200
National Supply Co., The 32, 33
Nicholson & Co., W. H. 64
Nordberg Manufacturing Company 189
Norris Brothers, Inc. 198
Oakite Products, Inc. 203
Oil Equipment Mfg. Co., Inc. 156
Oil Well Mfg. Corp. 142
Oliver United Filters, Inc. 171
Otis Pressure Control, Inc. 116, 117
Paris Distributor, Inc., Henry H. 195
Perrault Brothers 196, 226
Petroleum Distributing Co. 202
Petroleum Equipment Suppliers Assn. 140
Pipeline Cleaners Co. 196
Pittsburgh Corning Corporation 59
Pittsburgh Plate Glass Company, Industrial Paint Division 9
Pittsburgh Steel Company 180
Quaker Oats Company 16
Ratigan, Inc., J. P. 244
Raybestos-Manhattan, Inc., Manhattan Rubber Division 34
Reed Roller Bit Company 155
Ridge Tool Company, The 68
Roof Manufacturing Co., Inc. 199
Ross-Martin Co. 67, 145
Santa Fe System Lines 164
Schlumberger Well Surveying Corp. 55
Security Engineering Co., Inc. 98
Seismograph Service Corp. 143
Shaffer Tool Works 147
Sheffield Steel Corporation 21
Sivalls Tanks, Inc. 115
Skinner Brothers Company 121
Smith Corporation, A. O. 150
Snap-On Tools Corporation 215
Southern Mill & Mfg. Co. 193
Standard Oil Co. of California 14
Standard Oil Co. of Indiana 53
Standco Brake Lining Co. 202
Stearns-Roger Mfg. Co. 151
Steel Forgings, Inc. 206
Superior Iron Works & Supply Co. 100
Technical Oil Tool Corp., Ltd. 212
Texas Company, The 27
Thomas Flexible Coupling Co. 229
Thompson Tank & Manufacturing Co., Inc. 222
Thompson Tool Co. 131
Thornhill-Craver Co. 45
Timken Roller Bearing Company 50
Tri-Service Drilling Company, Inc. 122
Trostel Packings, Ltd., Albert 61
Tulsa Engineering Sales Company 202
Union Asbestos & Rubber Co. 66
Union Carbide and Carbon Corporation, Carbide & Carbon Chemicals Company 157
U. S. Steel Corp. Subsidiaries 4, 46, 47
United States Steel Company 46, 47
United Supply & Manufacturing Co. 153
Visco Products Co., Inc. 90
Vogt Machine Co., Henry 7
Wagner Electric Corporation 30
Warner Lewis Company 198
Warren Petroleum Corporation 72
Web Wilson Oil Tools 226
Weil Equipment Mfg. Corp. 160
West Texas Electrical Log Service 145
Western Company, The 112
Westinghouse Electric Corp. 42, 43
Wheland Company, The 168
Whitmor Homebuilders, Inc. 162
Wichita Falls Foundry & Machine Co., Inc. 158
Wickes Boiler Co., The 192
Wickwire Spencer Steel Division, Colorado Fuel and Iron Corp. 69
Wilson Manufacturing Co., Inc. 134
Witte Engine Works Oil Well Supply Division United States Steel Company 4
Worthington Corporation 48


## Permian Basin

(Continued from page 219)

T&P, dry, TD 3,347 ft., elev. 2,991 ft., Delaware lime 3,125 ft., and 3,160 ft.

Tubb-Gann 1-B 1-57-T3-T&P, dry, 3,105 ft., elev. 2,945 ft., Delaware lime 3,030 ft., sand 3,097 ft.

Runnels County: Geochemical Surveys 1 Walter Adami, J. Ford Sur. 8, dry, TD 4,300 ft.

T. D. Humphrey 1 A. E. Rusk, Blk. 71, A-325, dry, TD 5,304 ft.

Schleicher County: Gray-Wolfe Co. 1 Thompson, 21-A-HE&WT, dry, TD 6,980 ft., elev. 2,427 ft., Strawn 6,500 ft., Ellenburger 6,790 ft.

Terrell County: Fred Turner Jr. 1 Turner & Noelke, 50-B2-CCSD&RGNG, dry, TD 11,667 ft., elev. 2,685 ft., Strawn 9,072 ft., Mississippian 9,372 ft., Devonian 9,606 ft., Ellenburger 11,299 ft.

### TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURES

Roberts County: C. B. Cree Jr. 1 Carter, 110-2-I&GN, 16 miles NW Miami, dry, TD 4,160 ft.

J. M. Huber Corp. 1 Christie-Tipps, 38-B1-H&GN, 7 miles N Miami, dry, TD 7,520 ft.

Wheeler County: Gulf Oil Corp. 1 Weatherly, Sec. 1, H&GN, 7 miles E Wheeler, strat test, dry, TD 4,250 ft.

### SOUTHEAST NEW MEXICO

Stanolind Oil & Gas Co. 1 Plecat Canyon unit, Chaves County wildcat in 34-10s-31e, was drilling ahead after recovering water with no shows on drill-stem test in the Devonian at 11,702-50 ft. The well has previously indicated production from the Wolfcamp and the Pennsylvanian.

Gulf Oil Corp. 1 Federal-General American, Eddy County deep test in Grayburg-Jackson field, found oil on first drill-stem test of the Pennsylvanian at 9,160-9,206 ft. The tester was open 1¾ hours to recover 50 ft. of oil and mud, plus 150 ft. of clean oil with no water. Later test at 9,204-38 ft. developed drilling mud. Drilling was continued.

Shell Oil Co. 1-CA State, 23-16s-36e, developed 120 ft. of mud-cut oil and 440 ft. Permo-Pennsylvanian lime at 10,307-30 ft. A 30-minute test at 10,330-55 ft. recovered 210 ft. of slightly gas-cut mud.

### SOUTHEAST NEW MEXICO SUCCESSFUL WILDCATS

Lea County: Amerada Petroleum Corp. 1 Allie M. Lee, 23-11s-32e, TD 10,695 ft., elev. 4,349 ft., pay 10,664 ft., IP 269 bbl. 46°-gravity oil, ½-in. choke, TP 250 psi., GOR 23 cu. ft.

The Texas Co. 1-BA State, 14-12s-32e, TD 10,600 ft., elev. estimated 4,375 ft., pay 10,000 ft., IP 949 bbl. 42°-gravity oil, 28/64-in. choke, TP 800 psi., GOR 1,895 cu. ft.

The Texas Co. 1 BJ State, 26-11s-32e, TD 10,807 ft., elev. 4,344 ft., Wolfcamp pay 9,736 ft., IP 156 bbl. 42°-gravity oil, ½-in. choke, TP 750 psi.

The Texas Co. 1 BP State, NW extension, 26-11s-32e, TD 10,041 ft., elev. 4,357 ft., pay 9,817 ft., IP 24 bbl. 52°-gravity oil, 24/64-in. choke, TP 600 psi., GOR 5,464 cu. ft.

**RATIGAN NO. 14 TRIANGLE "C" LINK** made in three sizes with capacities ranging from 60,000 to 150,000 pounds.

## insist on RATIGAN

**RATIGAN NO. 60 SNAP-TYPE ROD WRENCH** with round handle made in sizes to fit any size sucker rod or sucker rod coupling.

## ...when you want the BEST!

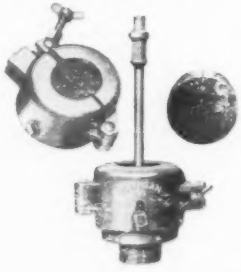
**RATIGAN NO. 89 SPRING SWIVEL TUBING LINK** with weight, and has a capacity of 150,000 pounds. End links can be opened or closed instantly by means of quick-acting safety pins.

***Ratigan Oil Well Pumping Equipment Is Engineered For Operator's Safety, Speed and Ease of Handling***

Ratigan Equipment is used extensively in all major oil fields and has a record of more than 30 years outstanding service. It is designed for utmost simplicity and quick, easy handling by the derrick men, and is in keeping with today's faster oil well pumping operations.

**RATIGAN NO. 91 SPRING TYPE SUCKER ROD HOOKS** have capacity of 90,000 pounds and are available with or without spring and with either long, medium or short bail.

**Insist on Ratigan Equipment . . . Sold Through Leading Supply Stores Everywhere.**

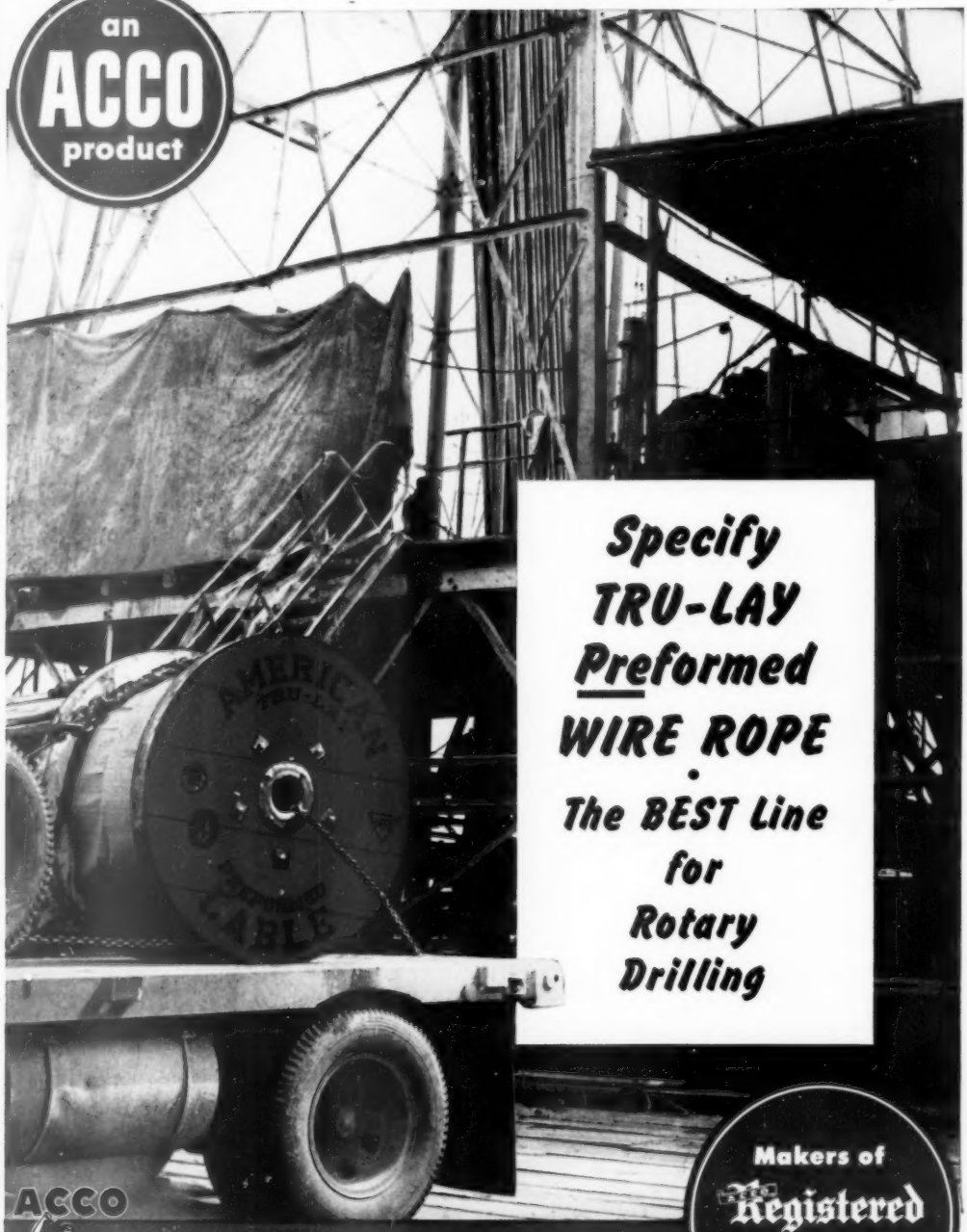


**RATIGAN NO. 144 ROD WIPER** especially suited to use with portable pulling machines. Acts as a stripper and shock absorber.

**J. P. RATIGAN, INC.**

1213 Santa Fe Avenue Los Angeles 21, California

**RATIGAN NO. 214 TUBING TONG** with fast, easy method of changing dies. Made in 1¼" size for Macaroni Tubing; and 2", 2½", and 3" sizes for regular tubing.


an
ACCO
product
Specify
TRU-LAY
Preformed
WIRE ROPE
The BEST Line
for
Rotary
Drilling
Makers of
Registered
WIRE ROPE
SLINGS
ACCO
AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE
TRADE MARK
Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York,
Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

# Why replace tool joints ?

You can avoid the expense of replacing tool joints by unitizing your drill stem with HUGHES *Flash-Weld* Joints—built to last the life of the drill stem.

This is true even where abrasive conditions are encountered. To meet this type of service, HUGHES hard-faced joints are recommended. For extreme abrasive service these same joints can be rehard-faced in the field, using hard-facing techniques developed by Hughes.

Operating records show that drill stem costs per foot of hole drilled are lower when HUGHES *Flash-Weld* Tool Joints are used.

HUGHES *Flash-Weld* is the original integrally welded tool joint—proved on more than 22,000,000 feet of drill pipe and in 15 years of service.

FLASH-WELD
A DEVELOPMENT
OF
HUGHES
TOOL COMPANY
HOUSTON, TEXAS